REPORT TO THE COMMITTEE ON GOVERNMENT OPERATIONS HOUSE OF REPRESENTATIVES

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

Implications of Deregulating The Price of Natural Gas

Higher prices would bring some additional supplies of natural gas over what would otherwise occur. However, supplies are constrained by factors in addition to price, such as the ability to discover new reserves at a sustained, high rate. These factors indicate that the Nation will probably never again attain recent production levels.

Even with deregulation, natural gas production would be likely to continue to decline. Deregulation, however, could slow the rate of decline.

The price of natural gas will continue to rise, under either regulation or deregulation. However, with deregulation, price rises would be more rapid, except in the unlikely event that regulated prices were deliberately raised to intrastate levels and held there.

Therefore while additional gas supplies are likely from the higher deregulated prices, this advantage must be weighed against higher prices to consumers.

OSP-76-11

JAN. 14, 1976

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-181503

The Honorable Jack Brooks
Chairman, Committee on Government
Operations
House of Representatives

Dear Mr. Chairman:

This report presents the implications of deregulating the price of natural gas. It is the second of a two-part study that you requested in your letter of July 26, 1975.

The report discusses the supplies of natural gas that can reasonably be expected through 1985 under either continued regulation or deregulation. The environmental, economic, and social effects of deregulation are also analyzed.

The report on the first part of the study--an assessment of the economic and environmental effects of natural gas curtailments during the winter of 1975-76--was issued in October 31, 1975 (RED-76-39).

Sincerely yours,

Comptroller General
of the United States

Contents

ABBREVIATIONS

BBL	Barrel
BCF	Billion Cubic Feet
BTU	British Thermal Unit
CEQ	Council on Environmental Quality
FPC	Federal Power Commission
GAO	General Accounting Office
GNP	Gross National Product
LNG	Liquefied Natural Gas
OCS	Outer Continental Shelf
OPEC	Organization of Petroleum Exporting Countries
USGS	United States Geological Survey
TCF	Trillion Cubic Feet
MCF	Thousand Cubic Feet

COMPTROLLER GENERAL'S
REPORT TO THE COMMITTEE
ON GOVERNMENT OPERATIONS,
HOUSE OF REPRESENTATIVES

IMPLICATIONS OF DEREGULATING THE PRICE OF NATURAL GAS

Federal Power Commission
Federal Energy Administration

D I G E S T

Production of natural gas in the United States has been declining since 1973 when it peaked at 22.5 trillion cubic feet (tcf). Deregulation of natural gas sold in interstate commerce is under consideration as a way to reverse this trend and contribute to solution of the Nation's energy problem.

The issues surrounding natural gas deregulation are complex. This report, prepared at the request of the Chairman, House Committee on Government Operations, examines the likely energy, environmental, economic, and social implications of deregulation.

SUMMARY OF GAO CONCLUSIONS

Even with deregulation, natural gas production is likely to continue its decline. Deregulation could, however, slow, and possibly arrest the rate of decline. Without it, production would decline even more steeply. In summary, it is not likely that the Nation will ever again achieve production in the amounts currently being experienced.

Even with continued regulation the price of natural gas will increase, but with deregulation the increase would be more rapid.

The additional supplies of gas likely to result from deregulation must be weighed against the additional costs to consumers. The undesirable implications of continuing a regulatory framework which creates separate interstate and intrastate markets also must be considered.

Deregulation must be carefully weighed against other alternatives which include continuing regulation, but at higher prices, and bringing intrastate supplies under Federal regulation.

The implications of deregulating natural gas and allowing it to rise to the equivalent price of imported oil--which is not established in a free and competitive market--also must be carefully considered.

In the final analysis, deregulation requires a political judgment based on a careful weighing of the trade-offs involved in alternative courses of action.

FINDINGS

Under deregulation, it is generally assumed that natural gas prices will rise substantially, perhaps to the equivalent price of oil, thus providing more incentive for exploration and resulting in new gas finds. With continued regulation it is assumed that the price of gas sold in interstate markets, while rising gradually, will remain considerably below either the price of gas sold in intrastate markets or the equivalent price of imported oil--the likely substitute fuel for any shortfall in natural gas supplies.

While these basic assumptions underlie much of GAO's analysis, the report points out that higher prices and many of their effects could occur under continued regulation. Proposals have been made for retaining Government price regulation while substantially increasing the current regulated price.

GAO's study covers the period 1975 to 1985.

Energy Effects

GAO found consensus of opinion concerning the amount of annual additions to natural gas reserves necessary to maintain a particular level of natural gas production. Using this consensus, GAO developed three supply cases. (See p. 16)

--The low supply case assumes continued regulation with pricing patterns similar to that occurring in recent years. Reserve additions would average 10 tcf per year from 1975 to 1985. By 1985 total annual natural gas supply, including Alaskan, imported and synthetic gas, would have declined from the 1975 level of 21.4 tcf to 17.2 tcf.

--The medium case assumes deregulation and new gas finds equal to the best 10-year period previously experienced in the history of U.S. natural gas exploration. Reserve additions average about 12 tcf with natural gas supplies in 1985 projected to be 18.7 tcf.

--The high case assumes deregulation and new finds larger than ever previously experienced. Reserve additions average about 18 tcf with natural gas supplies in 1985 projected to be 21.4 tcf--about the same as 1975. If past performance is an indicator, additions to reserves of this magnitude imply discovery of at least 4 or 5 large gas fields with reserves on the order of 10 tcf. Only one gas field of this size has been discovered in the U.S., except in Alaska, since 1945.

GAO concluded that, while its high case seems to place an upper limit on likely gas supplies under deregulation, it is probably unrealistic.

GAO believes that its medium case is optimistic, but attainable. The medium case results in increased natural gas supplies in 1985 of 1.5 tcf (about 9 percent) over projected supply under the low case which assumes continued regulation. (See p. 26)

However, when compared to natural gas supplies in 1975, the medium case results in a 13 percent decline in supply by 1985 as compared to a 20 percent decline under the low case (continued regulation). (See p. 28)

Since the projected decline in natural gas supplies is likely to be replaced by increased amounts of imported oil, an additional 1.5 tcf of natural gas each year could reduce oil imports by 750,000 barrels per day. Assuming a cost of $12 per barrel for imported oil, such an increased supply would have a positive balance of payments effect of about $3 billion per year. (See p. 27)

Higher prices for natural gas--with or without deregulation--would have their major impact on supplies in the lower 48 States. They would have little or no positive impact upon Alaskan or imported natural gas and could have a negative impact on synthetic gas since they could lessen somewhat the incentive to develop this high cost source of supply.

Environmental Effects

The environmental effects of natural gas deregulation require analysis of the trade-offs between decreasing the importation of oil and increasing the production of natural gas. (See p. 29)

Gas production can have environmental effects from accidents such as explosions and also from oil pollution to the extent the gas is found in association with oil. This latter aspect is more severe offshore. (See p. 29)

The environmental problems involved in producing and transporting natural gas seem about equal with the environmental consequences of oil imports. (See pp. 29-33)

However, because natural gas is a clean-burning fuel, it has clear advantages in the consumption stage, which should result in any increased supplies under deregulation having an overall beneficial impact on the environment. (See p. 34)

Economic and Social Effects

The economic and social effects of deregulation are intertwined. From a national economic viewpoint there is concern over the effect of deregulation on the Nation's recovery from a deep recession. There are also serious economic and social concerns regarding the effect of deregulation on:

--distribution of natural gas supplies between intrastate and interstate natural gas markets,

--aggregate consumer costs, and

--industrial and residential consumers.

National Effects

Using the Wharton economic simulation model, GAO computed national economic projections for its three natural gas supply cases. (See p. 36)

GAO assumed that under deregulation the price of all natural gas (in constant 1975 dollars) would rise to $1.75 per 1,000 cubic feet (Mcf) at the wellhead, plus $.35 in pipeline transportation costs--a total price at the city-gate of $2.10 per Mcf or the British Thermal Unit (Btu) equivalent price of $12 per barrel oil. Under continued regulation GAO assumed that the average price of regulated interstate gas would increase at a rate of $.05 per Mcf per year from an average of $.35 in 1975.

Simulations were run comparing continued regulation with deregulation if the average deregulation price reached $2.10 (city-gate) in 1980 or 1985. In all cases Gross National Product, the rate of inflation, and the rate of unemployment are virtually the same indicating that, in the aggregate, deregulation is not likely to have discernible consequences for the Nation's economy. Regional and sectoral effects, however, could vary. The absence of significant differences in our simulations is probably related to the small percentage of economic activity which the market for natural gas currently represents--about $20 billion out of a GNP of $1,300 billion. Under GAO's primary assumptions the maximum additional cost of deregulation in any one year would be $13 billion in 1980. Given the statistical accuracy of national economic models, a change of this magnitude may not be readily discerned.

Interstate and Intrastate Gas Supplies

Under our current regulatory framework, the interstate and intrastate markets for natural gas are separate and distinct. New interstate natural gas is now priced at 52 cents per Mcf at the wellhead, while new intrastate gas sells, on the average for about $1.17 per Mcf--some recent contracts have exceeded $2.00. (See p. 38)

A comparison of reserve additions dedicated to the two markets clearly indicates the incentives created by the price difference in recent years. From 1964 to 1969, two-thirds of additions to reserves in the lower 48 States were dedicated to the interstate market and one-third to the intrastate market. For 1970 to 1973, 92 percent of reserve additions in the lower 48 were dedicated to the intrastate market. (See p. 39)

Assuming a continuation of this trend GAO estimated that interstate supplies under continued regulation could decline to 7.7 tcf in 1985--down from 11.1 tcf in 1975 and a decrease of over 30 percent. Intrastate supplies meanwhile would decline by less than 10 percent. (See p. 40)

With deregulation and the resulting elimination of the price differential, GAO estimated the relative share of natural gas going to interstate and intrastate pipelines would remain virtually the same. Using its medium case for gas supplies, GAO estimated that interstate supplies by 1985 would decline to 9.5 tcf--down 13 percent from the 1975 level. Intrastate supplies would decline to 9.2 tcf--also down 13 percent. (See p. 40)

Consumer Effects

Using its supply and price assumptions, GAO compared the effects on consumers of continued regulation versus deregulation phased through 1980. This would be a rapid increase since natural gas is usually sold under long-term contracts. Should the average price take longer to reach comparability with oil, the effect of deregulation would, of course, be spread.

Further, consumer response, in the form of conservation would reduce the net increased cost of energy. GAO believes that its estimates serve to identify the probable upper range of consumer costs.

GAO estimated that under deregulation the maximum additional costs to consumers of natural gas in constant 1975 dollars would peak at $13 billion in 1980, decreasing to $4.2 billion in 1985. The cumulative additional costs of deregulation under GAO assumptions for the 10 years ending in 1985 is estimated at $75 billion, or an increase of 22 percent over the cumulative city-gate costs with continued regulation. (See p. 44)

Under GAO's assumptions, costs to consumers under continued regulation would continue to increase because of price rises within the regulatory framework and because consumers who could no longer buy natural gas would purchase substitute fuels at higher prices.

Ideally, the additional revenues to producers under deregulation should be invested in additional exploration and development of natural gas or in development of other substitute energy sources. However, if such investment were not forthcoming, there may be need for specific requirements regarding reinvestment of additional revenues resulting from deregulation. (See p. 46)

Industrial and Residential Effects

Many industries which now use natural gas will be subject to higher fuel costs whether gas deregulation occurs or not. (See p. 47)

Additional industrial fuel costs resulting from deregulation of natural gas or the use of alternative fuels should not be significant in the aggregate. Total expenditures by industry for natural gas in 1974 represented less than 1 percent of the monetary value of industrial output. (See p. 47)

Some industries, however, could be severely impacted. (See p. 47) They include

--industries for which natural gas costs represent a significant portion of their selling price (such as the cement industry)

--industries which depend upon natural gas for its unique material or quality heating value rather than for its energy value and for which there is no practical substitute (such as the fertilizer, plastics, certain textile and baking industries).

Under continued regulation, gas dependent industries obviously will have an incentive to locate in gas producing areas.

Because FPC regulations give priority to residential customers in times of shortages, most interstate residential customers would continue to receive supplies under continued regulation. Therefore, the primary impact of deregulation on those residential consumers would be in increased prices. However, prices also would continue to increase under regulation, but more slowly. (See p. 50)

GAO estimated that deregulation would increase costs to residential consumers nationwide by 40 percent in 1980 and 10 percent in 1985 over what they would be with continued regulation.

Costs under deregulation in constant 1975 dollars would increase from an average of $1.50 per Mcf in 1975 to $2.77 by 1980 and 1985. Under continued regulation costs would increase from an average of $1.50 per Mcf in 1975 to $2.04 by 1980 and $2.52 by 1985. (See p. 51)

CHAPTER I

INTRODUCTION

During the last several years, events such as the 1973 Arab oil embargo have led to a reassessment of our national energy policies. Deregulation of the price of natural gas sold in interstate markets is under consideration as a partial solution to the Nation's energy problem.

The Chairman of the House Government Operations Committee requested a study for the Subcommittee on Conservation, Energy, and Natural Resources. The study was to assess: (1) the social, economic, and environmental consequences that would result this winter (1975-76) from natural gas curtailments of the magnitude forecast by the Federal Power Commission (FPC) with special emphasis on what industries will be most severely affected and what alternatives are available to them and (2) the natural resource, economic, environmental, and social impacts that would result if a decision were made to deregulate the price of interstate natural gas. The report on the first part was issued on October 31, 1975 (RED-76-39), and this report constitutes part two.

METHODOLOGY

There are five major areas of natural gas supplies: the lower 48 States (including the Outer Continental Shelf), Alaska (including the Outer Continental Shelf), Synthetic Pipeline Quality Gas (SNG), Liquefied Natural Gas Imports (LNG), and Canadian imports. Higher prices, with or without deregulation of natural gas, would have its major impact on supplies in the lower 48 States. The impact would not be as great in the other areas for a variety of reasons which are discussed in chapter III.

Previous studies by both industry and Government have given widely varying projections for future natural gas production, whether in a regulated or deregulated environment. Sources of these differences have been such areas as the added incentive to explore for gas as a result of higher prices, the amount of natural gas which would be economically recoverable at a particular price, and probable finding rates. Despite these differences there is a general consensus of opinion concerning the amount of additional reserves which must be discovered to achieve

a particular production level in a given year. This consensus is the basis for the forecasts of future natural gas production in this study.

As a result, the three forecasts discussed in this study for natural gas supplies involve additions to reserves in the lower 48 States as the principal variable. They are

--a low estimate, which assumes continued low prices and low additions to lower 48 reserves as has been the case since 1969;

--a medium estimate, which assumes higher prices resulting in lower 48 new finds returning to their 1955 to 1965 average level;

--a high estimate, which assumes that some of the lower 48 new fields found in the medium estimate would be unusually large.

Although we consider the medium estimate to be more likely, the high estimate is presented to identify what is considered to be an upper limit for optimistic forecasts.

There is no guarantee that price deregulation would result in any additional quantities of gas; however, it is reasonable to assume that a deregulated environment and its presumed higher prices would provide added incentive to explore for gas, and additional exploration would improve the chances of finding more gas. A premise used in this study is that continued regulation would result in a continuation of recent experience concerning reserve additions in the lower 48 States (the low estimate), while deregulation would result in reserve additions within the parameters established by the medium and high estimates. For the other, less traditional, sources of natural gas such as Alaska, liquefied natural gas imports, and synthetic natural gas, the number of such projects that might be completed within the next 10 years and the amount of gas that can be expected from these projects under regulated and deregulated environments has been established.

The environmental, economic, and social implications that could result from each of the above estimates have been analyzed. In the analysis of environmental implications, natural gas is compared with alternative fuels in terms of the effects of production, transportation, and consumption. The economic and social implications resulting from higher prices are evaluated with reference to--

--the impact on the national economy as represented by changes in the gross national product, the rate of inflation, and the rate of unemployment;

--the impact on the allocation of gas supplies between the intra- and interstate markets; and

--the impact on the industrial and residential use sectors.

This study discusses the implications of higher natural gas prices which would be likely to occur under deregulation although higher prices could occur under continued regulation. The term deregulation is used throughout this study, but almost all of the implications described would likely occur under continued regulation if prices were allowed to approach the market price for alternate fuels.

PRINCIPAL ASSUMPTIONS

The following assumptions were used in this study. All price assumptions are expressed in constant 1975 dollars.

1. Continued regulation would result in a continuation of recent experience concerning reserve additions in the lower 48 States. A deregulated environment and its presumed higher prices would provide added incentive to explore for gas and additional exploration would result in more natural gas discoveries in the lower 48 States.

2. Under continued regulation average wellhead* interstate natural gas prices from lower 48 sources are projected to increase $.05 per 1,000 cubic feet (Mcf) per year from a base of $.35 per Mcf in 1975 reaching $.85 per Mcf in 1985. Intrastate wellhead prices are projected to increase $.15 per Mcf per year from a base of $.50 per Mcf in 1975 reaching $1.75 per Mcf in 1983 (which is the equivalent price to oil) and to remain constant through 1985.**

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* Wellhead prices are the prices paid by pipeline companies to natural gas producers.

** Between 1973 and 1975 the interstate average price is estimated to have increased at a rate of about $.06 per year and the intrastate average price at about $.15 per year.

3. Under deregulation the average city-gate*** price of natural gas from lower 48 sources is projected to reach $2.10 per Mcf by 1980. This is essentially the British Thermal Unit (Btu) equivalent of $12.00 per barrel imported or uncontrolled domestic crude oil at the refinery and, as such, is assumed to represent the market clearing price for natural gas. The current average city-gate price is about $.83 per Mcf. The $2.10 per Mcf city-gate price less $.35 per Mcf, which is the average interstate pipeline transportation charge, results in an average wellhead price of $1.75 per Mcf. The wellhead price for gas in intrastate pipelines is also projected to reach $1.75 per Mcf by 1980 since interstate pipeline could compete for intrastate gas. Raising the average price for lower 48 gas to $2.10 per Mcf within 5 years may, in fact, be too rapid an increase due to the fact that natural gas is usually sold under long term contracts, but it serves to present a reasonable upper limit to the economic consequences of deregulation.

4. City-gate prices for natural gas supplies from Alaska, LNG and Canadian imports, and SNG, are projected to average a constant $2.10 per Mcf over the period 1975 to 1985 under both regulation and deregulation.

5. All transportation and distribution charges are assumed to remain constant.

6. Additional natural gas production would tend to displace imported oil in the energy supply/demand balance.

7. Deregulation only affects FPC authority over wellhead prices. FPC regulatory authority with regard to customer priorities would remain unchanged.

*** City-gate prices are the prices paid to pipeline companies by distribution companies or occasionally by industrial users.

CHAPTER II

BACKGROUND ON THE NATURAL GAS INDUSTRY AND ON THE PROCESS OF DEREGULATION 1/

Certain aspects of the natural gas industry are unique. Both its mode of operation and the market for its product have several distinguishing characteristics. In addition, the interstate portion of the industry is regulated by the Federal Power Commission (FPC), which has assumed several different postures since it was first required to regulate the industry. Another factor to be considered is the manner in which deregulation would be imposed on the economy. These factors merit special consideration before the implications of deregulation can be properly discussed.

This chapter provides background on the natural gas industry, summarizes the arguments for and against deregulation, and discusses alternative approaches to deregulation.

THE NATURAL GAS INDUSTRY

The operations of the natural gas industry in the United States can be conveniently divided into three phases: field, pipelines, and distribution. The field phase ends when the natural gas is sold at the wellhead. Producers of natural gas seek and develop natural gas reserves and then contract with a natural gas pipeline company to deliver gas. These contracts are generally long term, usually covering a period of 15 to 20 years. The pipeline companies purchase this gas in the field, transport it to market, and sell it either to distribution companies for resale or directly to industrial consumers. Distribution companies are usually local public utilities that sell gas to residential, commercial, and industrial customers. This study analyzes the regulation of the field or wellhead price of natural gas. To provide a background for the standard procedures of natural gas producers, we discuss below the technology and economics of natural gas production and the economic regulation of the natural gas industry.

Technology of natural gas production

Almost all commercially used gas is dry gas which yields about 1,000 Btu's per cubic foot. On a Btu basis, natural gas currently accounts for approximately one-third of the U.S. energy supply. Natural gas, formed from the

decomposition of organic materials, seeps upward through porous rock until it encounters a layer of nonporous rock where it accumulates in "traps" or "pockets." A field of natural gas consists of a group of these pockets that occur near each other or in layers above and below each other. Natural gas found in the same trap with oil is called "dissolved gas" when it is in solution with the oil, or "associated gas" when it occurs in a layer above the heavier oil. When gas is found alone, it is called "nonassociated gas." For the past 10 years most natural gas reserves have been nonassociated.

For purposes of presentation, we divide the natural gas production process into three segments: exploration, development, and extraction. Production of natural gas refers to the entire process, from exploration to pipeline shipment. Exploration and development are the processes of finding and delineating reserves of natural gas, and extraction is the process of depleting those reserves and delivering the product into a pipeline.

The quantity of reserves offered for sale depends on two important factors: the stock of gas in the region and technological progress and its effect on discovery and production costs. Technology is directly responsible for the growth in the use, production, and exploration of natural gas. The growth in the use of natural gas has to a large extent been determined by the availability of engineering facilities for its economical discovery, production, and transportation. Small amounts of natural gas had been available and used in the early 1900s, and until the last 30 to 40 years use was always close to the gas source. During those times, gas production was invariably associated with the rapidly expanding production of liquid petroleum products. Transportation facilities were minimal. Technological improvements have brought about changes and have contributed to the increased availability of natural gas as a primary energy source. These are:

--Improved techniques for constructing long-distance gas pipelines with large diameters capable of handling high pressures.

--Improved exploration and production facilities for hydrocarbons, particularly in off-shore waters.

--Developments in large-scale submarine pipeline construction, allowing gas (and oil) to be brought ashore.

Economics of natural gas production

There are costs associated with the production of reserves and pipeline shipments. There are costs for all three phases of production. However, some phases of natural gas production are more susceptible to cost and price changes than other phases. Extraction costs are closely related to the current level of output. (Costs per 1,000 cubic feet of output can be readily computed for these activities.) As the pressure from a reservoir drops, output slows down and extraction costs increase. A well will usually be "shut-in" for economic reasons when the wellhead price of natural gas falls below current extraction costs. Thus, a higher wellhead price for natural gas is likely to postpone shutting in wells and to bring some shut-in wells back in operation. The exploration phase is further removed from such economic incentives as higher prices. However, higher prices for natural gas should marginally increase the intensity of exploration for new fields.

Development costs are likely to be the most sensitive to short-term economic incentives and therefore the most responsive to increases in wellhead prices. Development, exploration, and extraction expenditures each account for about one-third of total production expenditures.

In general, higher prices for natural gas at the wellhead could be expected to have their largest impact on the development phase because producers would more actively extend and revise their existing fields. Onshore, this extension would be primarily in deeper drilling; offshore, it would mean deeper drilling over larger areas. All of these activities are most costly in terms of time and money. Any great increase in extraction would probably require a lead time of at least 5 years. The crucial factor is the discovery of new reserves.

Economic regulation of the industry

Before 1954 FPC regulated pipeline prices only. The public utility nature of the pipeline companies provided the underlying rationale for that regulation. During that time the wellhead prices were unregulated. After the 1954 Supreme Court decision in the Phillips Case 2/, the FPC was instructed to regulate the wellhead price. It has been argued that the volume of new reserves has not kept up

with the increased demand because the regulated price has not increased rapidly enough to reflect increased costs of exploration, development, and extraction.

Buyers of reserves at the wellhead are natural gas pipeline companies seeking to deliver gas under long-term contracts to industrial consumers and retail public utility companies. Their scheduled annual deliveries to utilities and industry determines their demand for reserves to be dedicated at the wellhead.

Prices paid by a distributor to a pipeline (wholesale or "city-gate" prices) depend on field prices and delivery charges for transportation of gas from the wellhead to the distributor.

Markup prices for interstate pipelines are determined by the historical average costs of transportation and by the transportation profit margins allowed under FPC regulation. The regulation of wholesale prices creates considerable lags between changes in field prices and changes in consumer prices. FPC policy has been to allow wholesale prices to equal historical average field prices paid for gas at the wellhead plus markup. This average wellhead price--"rolled-in price"--changes slowly as prices rise on new field contracts. This slow change is because new contracts in any year provide only 5 to 15 percent of all gas under contract. This lag softens the impact of large increases in new contract prices in field markets. Distributors deliver gas to the final consumer, and for delivery they also charge a markup over their wholesale purchase price. Distributors are normally regulated by State public utility commissions.

DEREGULATION PROS AND CONS

Proponents of continued regulation contend that:

--FPC prices have not been too low but have provided adequate incentives for exploration and development and provide for recovering costs plus a reasonable rate of return.

--The natural gas market is not competitive. Evidence cited to back up this claim includes the fact that 85 percent of the natural gas produced is controlled by about 25 major companies.

--Pipeline companies which purchase gas have no incentive to obtain low prices since they pass these costs along to the consumers who have no choice of supplier.

--The current gas shortage is the result of industry strategy to gain deregulation of prices. While comprehensive information about withheld reserves is unavailable, many investigations have concluded industry reserve reports are understated.

--Regulation should be extended to the intra-state market to end the inequities of uneven distribution.

--Deregulation would not guarantee added natural gas production but would certainly lead to increased consumer prices and windfall profits.

--Continued regulation is necessary to equitably distribute natural gas and to insure that critical users obtain supply.

--Gas prices are low only in relation to oil prices established by a cartel--the Organization of Petroleum Exporting Countries (OPEC)--not by cost of production nor by free market standards, and deregulation would result in economic disruption for consumers.

Proponents of deregulation contend that:

--Low natural gas prices as set by the FPC have caused the present gas shortage.

--Price regulation based on costs provides inadequate industry incentive; exploration costs vary widely as do costs among competitive companies.

--Price regulation has resulted in prices below those of alternative fuels thereby encouraging excessive use of natural gas.

--Effective market competition is reflected in frequent changes in market shares among producers, and the majors' market positions change materially within short periods of time.

--There are 30,000 producers; the 4 largest control 24 percent of the market and the 8 largest control 42 percent, which is low when compared to other industries.

--The amounts added to reserves each year are far below the amounts needed to sustain current production levels.

--Economic imperatives and legal obligations prohibit producers from holding back their supplies.

--Inequitable distribution of natural gas supplies between the intrastate and interstate markets has been caused by regulation. Restriction of the interstate gas prices has caused the price differences between these markets.

--After deregulation, consumer prices would certainly increase but not excessively since the wellhead price constitutes only a small portion of the consumer's final price.

--Without deregulation natural gas production will probably continue to decline, thus increasing dependence on foreign oil.

THE PROCESS OF DEREGULATION

Objectives

A deregulatory action should attempt to balance the following factors:

--The need for more exploration and development.

--The impact of increases in retail prices.

--The effect on the overall national economy.

--Excessive growth in industry profit levels.

Balancing the above factors involves considerations of the timing (phasing) and coverage of deregulation, in terms of the extent to which natural gas supplies will be deregulated. For example, immediate termination of price regulation on the total supply would provide

--the greatest economic incentives,

--the harshest end user impact,

--the harshest national economic impact, and

--the maximum windfall profits.

This deregulation approach would satisfy only one of the four objectives: i.e., providing the greatest economic incentives, but by moderating the timing and the coverage, the impact on the consumer and on windfall profits can be mitigated. The coordination of timing and coverage is the key.

Timing

Timing of deregulation can be either immediate or phased. Immediate means that at some specified date some major portion of, or perhaps the total, gas supply price is decontrolled and the price is determined by market forces from that time forward. Phased means that the price of gas is deregulated gradually; for example, over a 3 to 5 year period.

The immediate approach has the advantage of being the simplest to execute and would tend to maximize capital investment response in the short term. However, it could also result in a period of high prices until supply and demand stabilized under the new price scheme.

Under the phased approach, a lesser degree of investment incentives would be present for a few years until the price was fully deregulated, but it would also avoid the impact of sudden large price increases.

Phasing is generally approached in two ways.

1. Pro-rata, which is a succession of price increases gradually moving toward an assumed market price for unregulated gas and competing fuels over a period of time.

2. Price-ceiling, which is an immediate movement to a price which is near the market price but is still controlled. The regulator adjusts the price periodically on the basis of the prevailing market price for natural gas and competing fuels until the end of the phasing period, at which time price controls are dropped.

Figure 1 illustrates the approaches to immediate and phased deregulation.

The phased approaches are intended to reduce the shock of extreme price movements pending additional supply. The pro-rata method eliminates the shock best but still is unrelated to the market price. The price-ceiling approach provides more of a shock but is related to the market price while still maintaining the element of control. It could restrict upward movements in the market price depending upon the volumes involved and the policy of the regulator in adjusting prices in response to the prevailing market price. The price-ceiling method also has the advantage of rising more quickly to a point near the market price for natural gas and other competing fuels. This method would help the interstate market compete more effectively with the intrastate market for new gas supplies.

Coverage

Numerous concepts have been debated regarding the portion of the natural gas supply which should be deregulated. The most common debates have occurred over

--total deregulation versus the deregulation of new gas;

--deregulation of onshore versus offshore gas; and

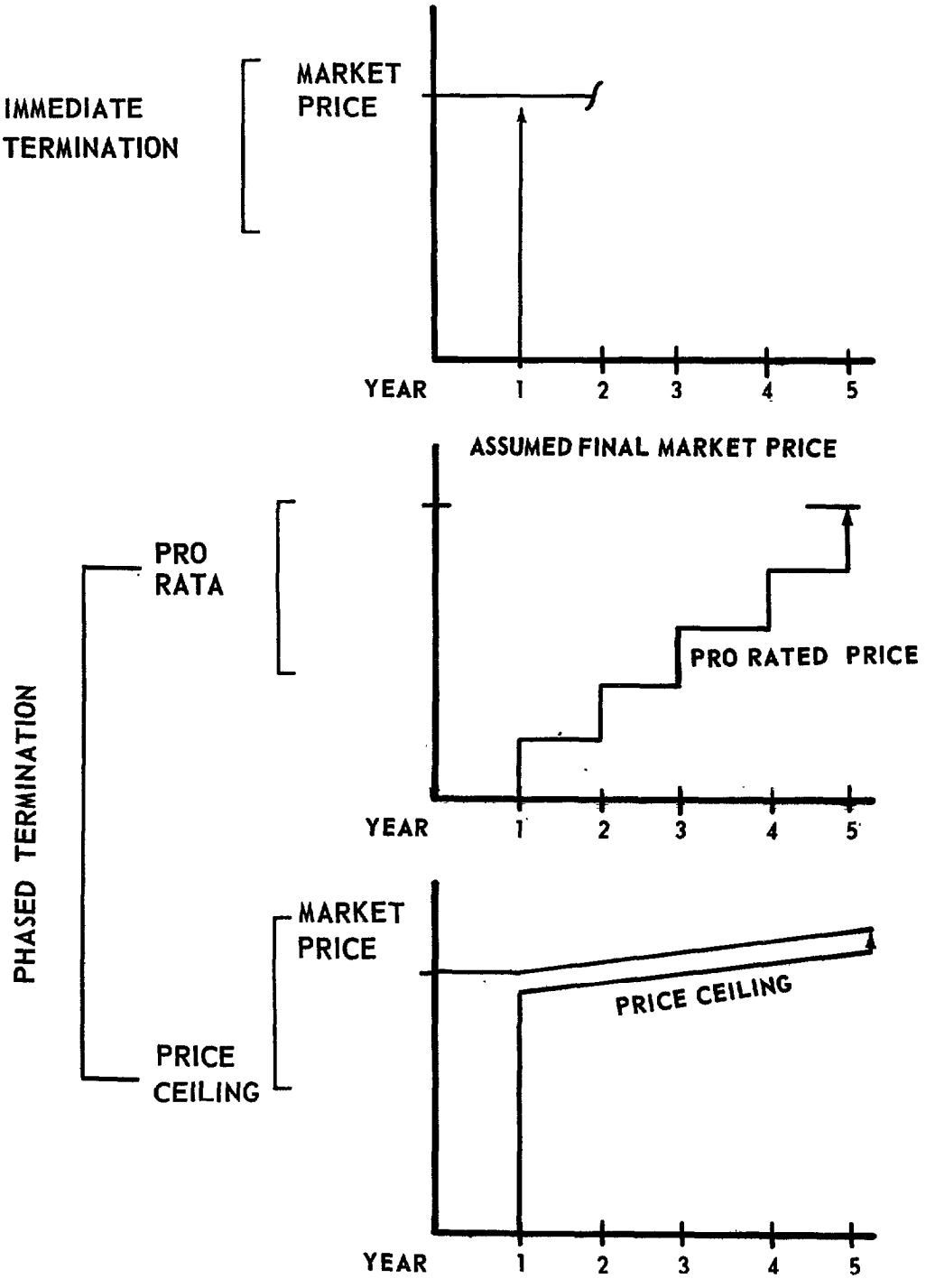
--high risk, high cost production versus low risk, low cost production.

Total deregulation refers to the removal of FPC price controls on all sales including gas currently being delivered under contracts negotiated under price controls. The price for future deliveries would be negotiated by the producers and the pipeline companies.

New gas has both narrow and broad definitions. Under the narrow definition it means gas which is not committed under contract; i.e., gas recently discovered or discovered after deregulation action is taken. Under the broad definition this is expanded to include gas under expiring contracts. Depending on the new gas definitions used, the pace of deregulation is quickened or slowed. The broader definition could generate exploratory capital quicker with only a small additional effect on the consumer. Expiring contracts between now and 1985 will make available an annual average of 451 billion cubic feet of gas to be renegotiated. This is only 2-1/2 percent of our annual consumption. When this increase

FIGURE 1

DEREGULATION TIMING METHODS



averages with transportation and distribution costs, the resulting cost on the end user is small. By 1985 the amount of gas flowing from expired contracts would total about 25 percent of total production. Although this would represent a small gradual increase to millions of consumers, when funneled to the smaller universe of producers it could provide meaningful incentive for exploration and development.

Either form of new gas deregulation--when compared to total deregulation--would create less exploratory capital, would create smaller increases in retail prices, would have fewer disruptive effects nationally, and would largely eliminate windfall profits.

The onshore-offshore distinction stems from the desire to help smaller companies while constraining the profits of the large companies. The offshore Outer Continental Shelf (OCS) area is dominated by the large companies, while the smaller independent companies concentrate on the onshore area. Thus, some argue that new onshore discoveries should be decontrolled while continuing regulation of offshore gas. Although such a distinction could help small companies, it would also curtail incentives in high cost, high risk, and high potential offshore exploration and development of new gas supplies.

The high risk, high cost-low risk, low cost distinction is used to encourage such exploration and development while not permitting high profits on low risk operations. It would tend to have the opposite impact of the onshore-offshore option. For example, decontrol, and thus higher prices, might be applied to exploration and development for new offshore, Alaskan, and deep onshore supplies but not applied to onshore shallow drilling activities.

Whether or not the coverage of natural gas deregulation can be legislated with the precision implied by these distinctions could depend on the wording of the statute regarding existing contracts with indefinite pricing clauses. As reported in GAO report titled, "Reliable Contract Sales Data Needed for Projecting Amounts of Natural Gas That Could Be Deregulated", of September 8, 1975 (RED-76-11), according to an FPC survey taken in 1973, about one-third of interstate contracts in effect at that time included some form of indefinite pricing clause which might permit the renegotiation of the price in the event of deregulation action by the Congress. Indications are that this trend has accelerated. Over half the long-term contracts filed with the FPC in recent months contained such clauses, presumably anticipating some form of price deregulation by the Congress. FPC regulations, however, specifically state that such indefinite pricing clauses "shall be inoperative and of no effect at law".

It would appear, therefore, that the Congress should recognize the existence of indefinite pricing clauses in existing contracts and express its intentions regarding such clauses in any possible deregulation legislation.

CHAPTER III

ENERGY SUPPLY IMPLICATIONS OF DEREGULATION

Natural gas which is domestically consumed comes from five sources, three domestic and two foreign. The domestic sources are the lower 48 States, Alaska, and pipeline quality (energy content greater than 900 British thermal units/cubic foot (Btu/cf)) gas synthesized from coal. The foreign sources are Canadian and liquefied natural gas. Higher prices for natural gas, whether resulting from deregulation or not, will affect each of these sources to a differing extent.

LOWER 48 STATES (INCLUDING THE OCS)

Since 1968 domestic natural gas reserves (excluding Alaska) have fallen 27 percent to 205.5 trillion cubic feet (tcf) by 1974. Domestic production in the lower 48 peaked in 1973 at 22.5 tcf but fell about 6 percent in 1974 to 21.2 tcf. 1/ In the first 6 months of 1975, production was down about 7 percent relative to the same period in 1974. 2/ It has been claimed that an important cause of these declines is the low, regulated wellhead price for interstate natural gas.

Many studies have claimed that deregulation would reverse the trend of production decline. Such conclusions are based on judgments on the price response to deregulation, the drilling rate response to higher wellhead prices, the amount of undiscovered resources, and the finding rates. These judgments are subject to great dispute. However, regardless of the differing judgments on these factors there is a reasonable consensus in both Government and industry regarding reserve additions required to achieve a particular level of production.* Moreover, the level and composition of reserve additions over the last 30 years indicate the reasonably expected limits of possible future levels of reserve additions. These reserve addition limits and the consensus regarding the level of reserve additions required to attain a particular level of production provide the basis for the estimate of the possible

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* Reserve additions are the estimated amounts of natural gas discovered and added to the known reserves. They include new discoveries as well as revisions and extensions of existing fields; i.e., the reestimation of the volume of gas (either positive or negative) of fields previously included in the estimate of known reserves.

production levels through 1985 which are projected in this study. Since 1946 the best sustained period of approximately 10 years for additions to reserves has been from the mid-1950s to the mid-1960s when total reserve additions averaged about 19 tcf per year with new discoveries at 6 tcf per year and revisions and extensions at 13 tcf per year. For the period 1969 through 1974 total reserve additions have averaged 9 tcf per year with new discoveries and revisions and extensions at 4 tcf per year and 5 tcf per year, respectively.

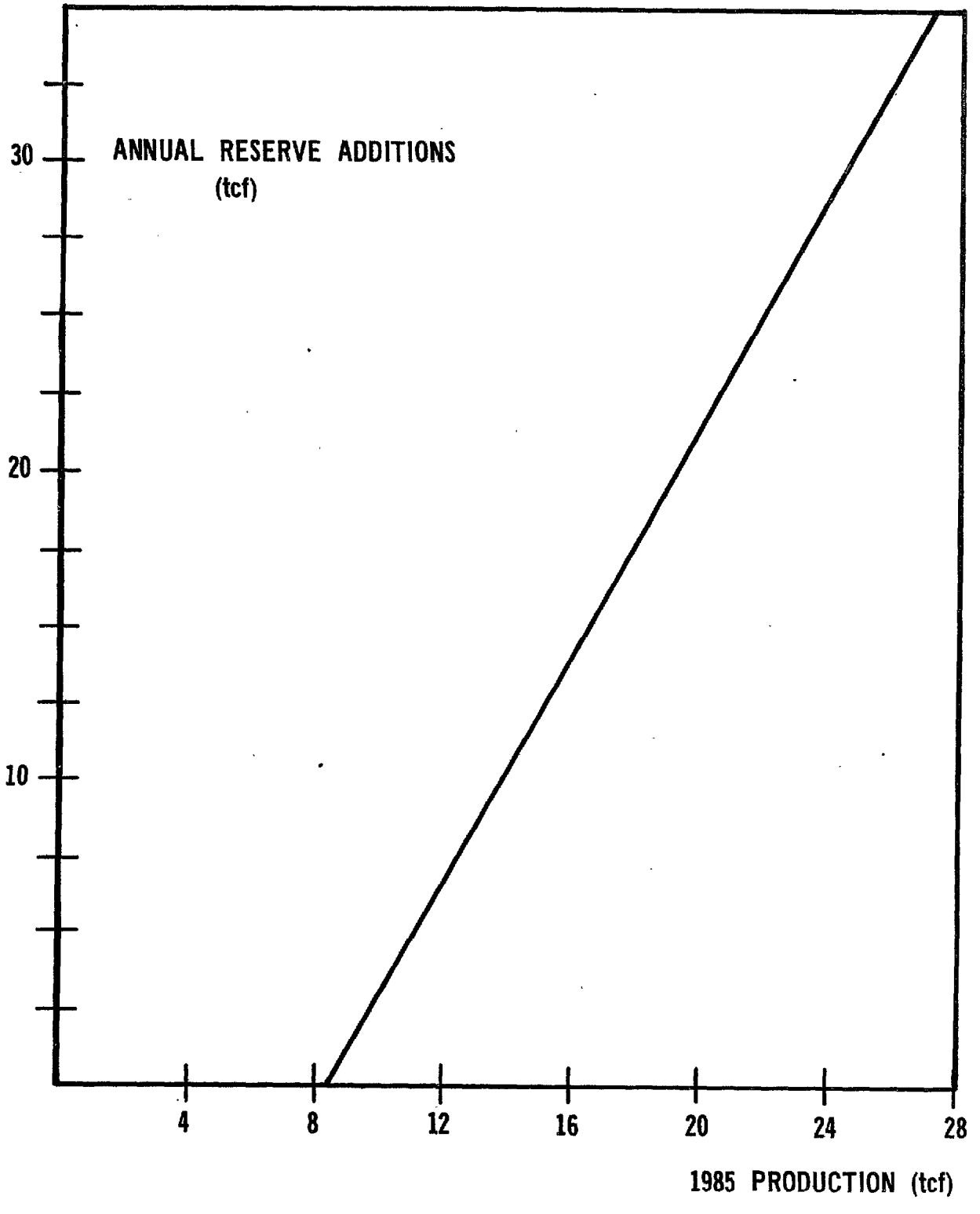
Figure 2 shows the average annual additions to reserves required to achieve a particular production level in 1985. The curve is developed from data contained in an FPC report of December 1974. 2/ The FPC report was based on data through 1972, so we have updated the base through 1974. Other studies by the National Petroleum Council and the American Gas Association are in substantial agreement with these requirements. Figure 2 shows that 1985 production of 14 tcf in the lower 48 States implies an average annual reserve addition of about 10 tcf for 1975 to 1985. This is slightly above the 9 tcf average reserve additions for the period 1969 to 1974. To maintain the current production rate of about 21 tcf requires an average annual reserve addition of over 23 tcf for the 11-year period 1975 to 1985, which is larger than what was observed over any prior 11-year period. On the basis of required reserve additions it would seem that maintaining existing levels of natural gas production would be very difficult, if not impossible.

From 1946 to 1967 revisions and extensions averaged about twice new finds. Since the decline in reserve additions in 1969, revisions and extensions have averaged 1.1 times new finds. The reduction in this ratio is largely because revisions to reserves have decreased, not increased, the previously projected size of the reserves.

The low reserve additions from revisions and extensions over the period 1969 to 1974 indicate that the average new reservoir is initially estimated closer to its maximum size than before 1969. Since revisions and extensions for a particular field are made over a period of years following initial discovery, the current low new finds (4 tcf per year for 1969 to 1975) should serve to continue the low revisions and extensions for some time in the future. This means that any significant reserve increases for the next few years must largely result from new finds.

FIGURE II

REQUIRED RESERVE ADDITIONS FOR LOWER 48 TO ATTAIN 1985 PRODUCTION



To achieve a reserve addition rate of 20 tcf per year (slightly larger than the average rate from 1955 to 1967) would necessitate the discovery of almost 15 tcf per year of new reservoirs for about 4 to 5 years, after which revisions and extensions to these new large finds could sustain the 20 tcf rate with a lower amount of new reservoir finds. Since new finds have averaged 4 tcf since 1969, such a possibility would imply the discovery of at least four or five large reservoirs or fields over the period with reserves on the order of 10 tcf apiece. The Gomez, West Texas, field is the only field 10 tcf or larger discovered since 1945 in the lower 48. Further there have been only two fields between 4 and 10 tcf discovered over the same period. 3/ This would indicate there is very little likelihood of returning to a sustained 20 tcf reserve addition per year over the period 1975 to 1985.

It should be possible to sustain the average rate of new finds at 6 tcf, the highest average new finds over an 11-year period since 1946. This would result in an average of 12 tcf per year of total additions to reserves from 1975 to 1985. Under very optimistic but unlikely circumstances it might be possible to double this rate of new finds for a few years to attain average reserve additions of 18 tcf. Subsequently, revisions and extensions might be able to sustain the level of reserve additions at 18 tcf per year. However 12 tcf of new reservoirs would imply the discovery of 4 or 5 fields during the period 1976 to 1985 on the order of 6 tcf or larger.

Average lower 48 reserve additions of from 12 tcf to 18 tcf per year would result in a lower 48 production level of from 15 to 18 tcf in 1985. Any production in excess of these levels would have a low enough probability to be of questionable use in planning for the Nation's energy future.

Undiscovered recoverable resources form the base for new finds of natural gas. Within the past year the U.S. Geological Survey has substantially reduced its estimates of this category for the lower 48. Formerly its estimates ranged from 715 to 1,415 tcf; today they range from 298 to 528 tcf. This reduction of undiscovered recoverable resources reduces the prospects for finding large amounts of additional new reserves in the lower 48. 4/

Industry believes that the best possibilities for large finds in the lower 48 is the OCS. Areas currently under consideration are mostly covered by up to 200 meters of water. While this depth poses no serious technological difficulties for the extraction of natural gas, the recent

failure to find exploitable reserves in the eastern Gulf of Mexico 5/ and off Newfoundland, coupled with the recent significant downward revisions of undiscovered resources on the OCS, have dampened the expectations of finding large amounts of gas on the OCS.

New fields are added to existing reserves once they have been delineated, but this addition is before any gas reaches the market. In the case of onshore fields this does not pose a problem since they can usually be brought into production within a year or less. In the case of offshore fields, it could be 4 to 5 years after delineation before any gas is produced. Should a significant amount of the new reserves be offshore, the time lag to bring such fields into production could result in production levels lower than indicated in figure 2.

In conclusion, under continued low prices, gas reserve additions in the lower 48 should continue at the current rate 9 to 10 tcf per year--from 1975 to 1985. This would result in production of about 14 tcf in 1985. Under higher prices maximum reserve additions should average between 12 and 18 tcf per year for 1975 to 1985 resulting in a 1985 production level of between 15 to 18 tcf by 1985. The major difference between the upper and lower limits is the probability of finding large fields greater than 6 tcf almost every year from 1975 to 1980. Since it is expected that the OCS has more potential than other areas for such discoveries, the 4- to 5-year time lag in bringing such fields into production further reduces the probability of the higher production figures (around 18 tcf) being obtained in 1985.

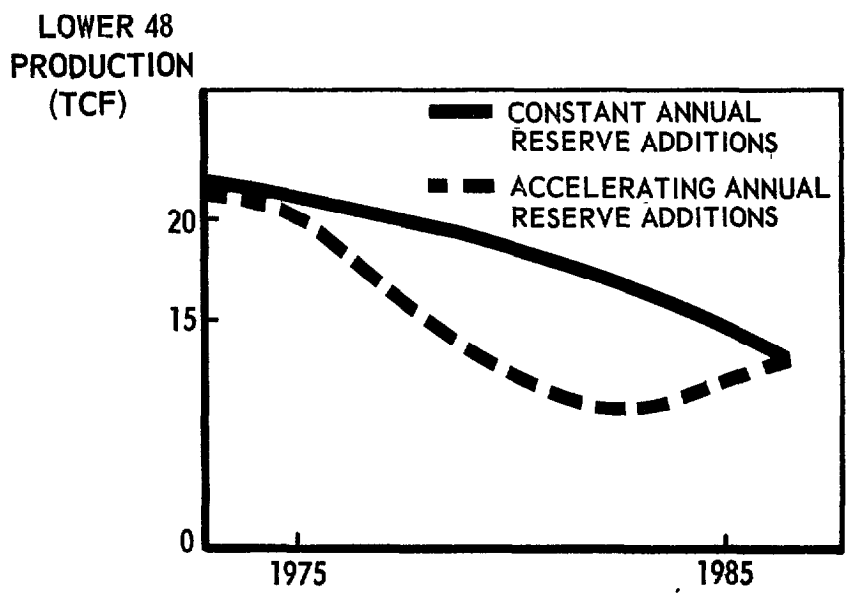
These results are summarized in table 1 which shows lower 48 production resulting from the low (10 tcf per year), medium (12 tcf per year), and higher (18 tcf per year) reserve additions.

Table 1. Lower 48 Natural Gas Production

	Reserve additions		Net Production			
	Average annual	Total	1975	1978	1980	1985
	(tcf)					
Low prices:						
Low	10	110	20.4	18.2	16.8	14.0
Higher prices:						
Medium	12	132	20.4	18.6	17.5	15.0
High	18	198	20.4	19.7	19.2	18.0

Yearly reserve additions are assumed to be constant over the period 1975 to 1985 to simplify calculations for production in those years between 1975 and 1985. Should reserve additions materialize at an accelerating pace over the next 10 years but achieve the same total reserve addition by 1985, it would have little effect on 1985 production, but it would result in a steeper fall-off for production in the early years of the period and then an increase to the 1985 level. This is illustrated in figure 3.

Figure 3



In the short term (1975 to 1978) some claim that production from shut-in reserves could result in an immediate increase of natural gas supplies. This is likely but the amount of production would not be large in terms of national requirements. As noted in chapter II, extraction costs are closely related to the current level of output and therefore a higher wellhead price is likely to postpone shutting in wells and bringing some shut-in wells back in operation. However, according to FPC 6/ and Department of the Interior studies 7/ of reserves under Federal jurisdiction, only .8 percent of Federal OCS reserves were shut-in for economic reasons in 1973. If shut-ins for economic reasons on non-Federal lands dedicated to the interstate market were 5 times larger than on Federal lands, or about 4 percent of these reserves the

higher natural gas prices might increase interstate natural gas supplies on the order of .3 tcf, about 3 percent of current lower 48 production for the interstate market. Thus, in terms of the deregulation question, increased production from shut-ins is not an important factor.

ALASKA (INCLUDING THE OCS)

The greatest prospect for a major domestic addition to U.S. gas supplies by 1985 is from the fields at Prudhoe Bay on the North Slope. These fields have estimated reserves of 26 tcf, which is the lion's share of total Alaskan gas reserves. Since these fields are associated with oil, they cannot be produced until oil production begins.

There are two proposals before the Federal Power Commission (FPC) at this time which would connect the Prudhoe Bay gas reserves to consumers in the lower 48.* The FPC believes that the gas reserve estimates are not large enough to support two pipelines, even though each pipeline would only move from .8 to 1 tcf per year in the initial stages. The FPC opinion is based on the fact that associated gas cannot be produced as quickly as an equal volume of nonassociated gas. Another reason for the FPC position is that pipelines are very costly--$6 and $8 billion. Two such projects at the same time could severely affect capital markets. The El Paso proposal, which would be completed earliest, claims to be able to deliver gas by 1981. Arctic Gas claims 1983.

In the low estimate, 1985 gas production in Alaska would come from the Gulf of Alaska in South Alaska and from Prudhoe Bay. The gulf production would include an LNG project which would deliver 0.15 tcf to California beginning in 1978. Overall South Alaska production would grow from about .1 tcf in 1975 to .3 tcf in 1980, with any further growth dependent upon additional LNG projects. The North Alaska production will be 1.0 tcf per year beginning in 1982.

Since Alaskan gas is not presently sold in the interstate market, there is no established regulated price. If gas prices are deregulated before that date, there would be no way to compare the effect of a higher price on production. Furthermore, since Prudhoe Bay gas is associated, gas production would be mostly determined by oil production, not gas prices.

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* The El Paso Pipeline and LNG project and the Arctic Gas pipeline project.

Leadtimes in exploration and development in Alaska are longer than those in conventional areas. This could mean that even if there is additional interest in searching for gas because of higher prices, actual production from these areas would probably begin after 1985. However, higher market prices for natural gas could possibly result in an increase in pipeline carrying capacity from the current design of about 1 tcf per year to about 1.5 tcf per year. This could be done by adding compressors and investing in increased Prudhoe Bay oil production to increase gas flow through the pipeline. Thus, under deregulation Prudhoe Bay gas production is expected to grow to 1.5 tcf.

The following table depicts the estimates of natural gas production in Alaska between now and 1985 with and without regulation.

Table 2
Alaskan Natural Gas Production

Lower 48 estimates	1975	1978	1980	1985
		(tcf)		
Low	.1	.2	.3	1.3
Medium	.1	.2	.3	1.8
High	.1	.2	.3	1.8

SYNTHETIC PIPELINE QUALITY GAS FROM COAL

The production of synthetic pipeline quality gas from coal is expected to cost $4.00 to $5.00 per Mcf. At such prices SNG will not be competitive with even the current high prices for intrastate gas; it will be used to meet demands for natural gas arising from the production decline in the lower 48. The urgency to construct first generation SNG plants will be somewhat related to the shortfall of lower 48 production.

Under deregulation city-gate natural gas prices are expected to rise to about $2.10 per Mcf, but this would still not make SNG price competitive. Should deregulation result in substantially increased lower 48 production, this could reduce the urgency for the developing SNG facilities.

As of early 1975 there were 4 SNG projects involving 10 plants, each of 250 MMcf per day capacity, for which both the type of gasification process and the coal feed requirements had been determined. 8/ Current schedules envision the first of the plants being operational in 1982 with about 6 plants being operational by 1985, resulting in a total production capacity of .5 tcf per year by 1985.

Deregulation is not expected to result in any increased high Btu gas production by 1985 and may even result in a reduction should lower 48 production greatly increase. Table 3 shows the projected production levels for high Btu gas.

Table 3
Production of Pipeline Quality Gas From Coal

	Lower 48 production estimates		
Year	Low	Medium	High
	(tcf)		
1975	0	0	0
1978	0	0	0
1980	0	0	0
1985	.5	.5	.2

CANADIAN IMPORTS

Imports by pipeline from Canada are not expected to be affected by an increase in the wellhead price of U.S. production. Canada's official energy policy is to phase out or sharply curtail natural gas exports to the United States. We assume that by 1985 Canadian exports to the United States will be reduced to .3 tcf, essentially the amount imported into the upper Midwest. Import levels for the period 1975 to 1985 are based on the assumption of a 10 percent annual decline from a 1975 level of .9 tcf.

Any increase in Canadian exports to the United States would be a result of a change in Canadian policy, not of the deregulation of natural gas wellhead prices in the United States. Table 4 shows the expected level of Canadian imports.

Table 4

Canadian Imports

	1975	1978	1980	1985
	(tcf)			
Imports	.9	.6	.5	.3

IMPORTS OF LIQUEFIED NATURAL GAS

Natural gas imports from nations other than Canada and Mexico require liquefaction for economical transportation by ship. The delivered price of LNG in the United States is expected to be about $2.30 per Mcf.

We assume that six LNG projects will be delivering gas to the U.S. market by 1985. This is somewhat optimistic since there is presently only one small long-term contract to import LNG. Two projects have long-term commitments with producing countries but will not begin actual imports until 1977 and later. Three additional projects are proposed to the FPC. However, not all negotiations with the producing country are completed.

The major issues which will strongly affect the future levels of LNG imports are

--the desirability of dependence on OPEC nations for natural gas at a time when official U.S. policy is to reduce oil imports from these same nations;

--the FPC allowing imported LNG contracts to have indefinite escalation clauses, something which has not been allowed before; and

--environmental opposition to LNG projects.

We conclude that the possibility of the six projects or additional projects being completed does not appear to depend on higher wellhead prices for domestic natural gas.

The following table shows the estimated level of LNG imports are expected to be the same under all three cases.

Table 5
LNG Imports

	1975	1978	1980	1985
		(tcf)		
LNG imports	.015	.4	.5	1.1

Summary

The supply forecasts presented here assume an anticipated higher price for gas under deregulation. Higher prices, however, could occur in a regulated environment. Proposals have been made to allow large increases in the price of natural gas under continued regulation.

Table 6 presents the low, medium, and high estimates which correspond to average annual reserve additions in the lower 48 of 10, 12, and 18 tcf, respectively, and to the variety of assumptions about production or availability of gas from the other less traditional sources.

Only under the high case would total natural gas supplies in 1985 equal the 1975 supplies of 21 tcf. We believe, however, that the high case is optimistic to the point of being unrealistic because of the large number of giant new fields which would have to be discovered in the lower 48 States to sustain the 18 tcf per year of reserve additions required through 1985.

Over the past several years we have produced and consumed natural gas at a rate faster than we have discovered new reserves. Production is now declining. The probable major impact of higher prices on production in the lower 48 States would be to slow the rate of decline but not to reverse it.

The medium case projects total natural gas supplies of 18.7 tcf in 1985, about a 13 percent decline below 1975 supplies. The low case, which assumes continued low prices and current additions to reserves, projects natural gas supplies of 17.2 tcf in 1985, 20 percent below 1975 supplies. Thus deregulation would result in an increase of 1.5 tcf--over supplies under continued regulation--in natural gas supplies in 1985.

Additional production of natural gas resulting from deregulation or higher prices would reduce the Nation's reliance on imported oil. For example, if supplies were 1.5 tcf greater in 1985 than they would otherwise be, U.S. oil imports could be reduced up to 750,000 barrels per day. This would represent about 12 percent of total oil imports in 1975 and, based on the cost of $12.00 per barrel for imported oil, an improvement in our balance of payments of up to $3 billion.

Table 6

Natural Gas Supplies

	1975	Low			Medium			High		
		1978	1980	1985	1978	1980	1985	1978	1980	1985
	(tcf)									
Domestic Production:										
Lower 48	20.4	18.2	16.8	14.0	18.6	17.5	15.0	19.7	19.2	18.0
Alaska	.1	.2	.3	1.3	.2	.3	1.8	.2	.3	1.8
Synthetics				.5			.5			.2
Imports:										
Canada	.9	.6	.5	.3	.6	.5	.3	.6	.5	.3
LNG		.4	.5	1.1	.4	.5	1.1	.4	.5	1.1
Total	21.4	19.4	18.1	17.2	19.8	18.8	18.7	20.9	20.5	21.4

CHAPTER IV

ENVIRONMENTAL IMPLICATIONS

There are two perspectives from which one should view environmental impacts for a particular energy form: those effects caused by normal operations and those effects caused by accidents. The production, transportation, and consumption phases of each energy source should be analyzed from both perspectives. For natural gas, the environmental effects which result from normal and accidental operations during these phases are usually less harmful than those resulting from other energy sources. This fact has helped make natural gas a very desirable fuel.

If natural gas prices are deregulated, any additional natural gas which might be supplied would tend to displace oil consumption, probably by replacing imported oil. Thus, in large part, the question of the environmental impact of natural gas deregulation is a question of the trade-offs between the benefits and disadvantages of decreasing the importation of oil and increasing the production of natural gas.

PRODUCTION

The techniques used in the onshore and offshore production of gas are essentially the same as the ones used for oil. The same type of rigs are used and approximately the same area and number of employees are involved for both fuels. Under normal operations the environmental effects can include land disruption, water contamination, and some localized air pollution.

Exploration of known natural gas formations, formerly not profitable to produce, could increase if gas prices rise due to deregulation. For the most part, the environmental impact of natural gas extraction is minimal and this possible increase in natural gas production is not expected to be harmful under normal operations.

There are greater environmental effects associated with production under accidental circumstances. Gas wells can have blowouts when there is a sudden surge of gas pressure up the drill hole and the blowout preventer does not shut off the hole. The blowouts force gas, drilling

mud, brine, and any associated oil to be sprayed into the air. Blowouts have a great potential for fire. Still, the effects are localized because the fire tends to be limited to the area of the drilling site.

The production of natural gas has more potential for environmental damage in both normal and accidental operations when it is found in association with oil because of the possibility of related oil spills and discharges. This is of particular concern for offshore production.

The amount of associated gas that would be produced as a result of deregulation and the effect on the rate of oil spills is difficult to quantify, but the following calculations can help to establish parameters. FPC estimates that offshore production will constitute about 30 percent of total domestic production by 1985, 1/ and the American Gas Association (AGA) estimates that about 30 percent of current reserves are associated with oil. 2/ Applying these ratios to the approximately 2 to 4 tcf of additional production in 1985 that could result from deregulation that was calculated in chapter III indicates that about 180 to 360 bcf of the additional production could be offshore and associated with oil. Using the AGA estimate of 30 percent of all U.S. reserves as being associated may in fact be too high for an offshore estimate since the Gulf of Mexico reserves are estimated at only 13 percent. However the gulf is the only offshore area in which we have reliable estimates. Although gas is expected to be discovered and produced in most frontier areas within the next 10 years, little development has occurred in those areas. Therefore, the national average is used here to demonstrate the highest reasonable range of potential danger to the environment likely to be encountered.

Between 1965 and 1973 the total amount of U.S. oil production was about 28 billion barrels (bbls). During the same period the total amount of associated gas produced was 43 tcf, resulting in an oil-to-associated-gas ratio of .65 bbls per Mcf. Projecting this ratio to the increased offshore associated production for 1985 referred to above (180 to 360 bcf) indicated that this increase would result in the production of about 117 to 234 million bbls of oil. U.S. Geological Survey (USGS) statistics indicate that between 1970 and 1974 the ratio of spills from OCS production to total OCS production was 1 bbl spilled per 14,000 produced. A projection of this ratio would indicate that oil spills resulting from the

additional oil production associated with gas would be at a rate of 8 to 17 thousand bbls per year by 1985. Whether this would result in severe environmental implications is difficult to determine because the severity of oil spills depends on multiple variables, such as the concentration of the oil spill, the physical and chemical nature of the oil spilled, the location of the spill, the currents, and weather conditions. However, a few statistics might help to put this into perspective.

Spills from OCS oil production have varied widely in the past. As many as 161 thousand bbls were spilled in 1967 in a single incident. In contrast, in 1966 zero spills were identified. The 1967 incident, a broken pipeline, resulted in minimal damage due to factors such as location and currents. The blowout off the coast of Santa Barbara, California, in 1969 spilled 10 thousand bbls at one time and resulted in an additional 14 thousand bbls in seepage in the next few years. This resulted in extensive immediate damage to wildlife and to the beaches although long-term effects are disputed. In the last 5 years the average amount spilled has been 27 thousand bbls per year. An annual Coast Guard report of polluting incidents in and around U.S. waters (coastal and interior) indicates that in the last 5 years the average annual discharge of polluting materials (mostly oil) has been about 400 thousand bbls. 4/ The principal sources have been onshore facilities, such as refineries and storage facilities and vessels. The potential oil spills of 8 to 17 thousand bbls, therefore, would constitute an increase of from 30 percent to 63 percent over the amount currently being spilled from OCS production. This is only 2 to 4 percent of the total amount of pollutants being discharged into U.S. waters.

TRANSPORTATION

Gas is usually transported by pipeline. LNG is transported mainly by special tankers. Except for Canadian and Mexican imports, all imported oil is transported by tankers. Each mode has its own environmental impacts.

Under normal conditions the transportation by pipeline of natural gas has minimal environmental effects, mainly land disruptions. However, pipeline accidents would have widespread effects if, for instance, a fire occured in a heavily populated area. These types of accidents do

not have a high rate of occurrence. The Department of Transportation's Office of Pipeline Safety report on pipeline accidents for 1974 shows 458 accidents for 284,318 miles of mostly interstate transmission and gathering lines. The accidents resulted in 4 deaths and 21 injuries. Comparable figures for other recent years are: 1973, 471 accidents and 2 fatalities; 1972, 409 accidents and 6 fatalities; 1971, 410 accidents and 3 fatalities.

Presently, liquefied natural gas is imported into the United States by tanker from Algeria and by truck from Canada. Although deregulation of natural gas prices would have little impact on the level of such imports, any importation of LNG poses the potential for serious environmental problems because LNG is difficult to transport and store safely.

Oil tanker operations under normal conditions damage the environment through oil and sewage discharge as a result of equipment failure, human failure, or normal discharge. Oil spills can result from groundings and collisions, such as the Torrey Canyon accident in 1967.

If the additional natural gas produced as a result of deregulation replaced imported oil, there would be fewer tanker calls in U.S. ports in 1985 and consequently fewer chances for oil spills. For example, we have calculated in chapter III that deregulation could result in additional natural gas supplies of about 2 to 4 tcf by 1985. The oil equivalent of 2 to 4 tcf is 340 to 680 million bbls. If the additional gas replaced imported oil on a one-for-one basis, 340 to 680 million fewer bbls of oil would be imported in 1985. In addition, as has been discussed previously in this chapter, the production of 2 to 4 tcf of natural gas is likely to result in the production of about 117 to 234 million bbls of oil found in association with the gas. This oil would also replace imported oil. The total reduction in imported oil, therefore, would be 457 to 914 million bbls, which is about 20 to 40 percent of our current import level.

Between 1970 and 1974 the average annual amount of crude oil and oil products transported in U.S. waters (coastal and interior) was about 5 billion bbls.*

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* This figure refers to all transportation of oil and oil products in U.S. waters and includes instances where a single bbl is transported more than once--e.g., in the form of both crude and product.

According to Coast Guard statistics, the volume of spills from tankers and tank barges for the same period was about 100 thousand bbls--or a ratio of 1 bbl spilled per 50,000 transported. If this ratio were to prevail, the 457 to 914 million bbls of imported oil that could be displaced in 1985 would result in a reduction of oil spills from tankers in the amount of 9 to 18 thousand bbls.

A comparison of the environmental implications in the production and transportation phases indicates the following. (1) The additional oil that would be produced with the gas amounts to about 117 to 234 million bbls. At a spill-to-production ratio of 1/14,000, 8 to 17 thousand bbls would be spilled into the sea. (2) The additional oil and gas produced would reduce import requirements by 457 to 914 million bbls which, at a spill-to-transportation ratio of 1/50,000, would result in 9 to 18 thousand bbls that would not be spilled into the sea. The result, therefore, is a standoff.

CONSUMPTION

The consumption phase is clear. It is an accepted fact that natural gas is one of the cleanest burning fuels available. For example, the Council on Environmental Quality (CEQ) has published a study comparing the environmental consequences of operating a hypothetical 1,000 megawatt (MW) electric energy system operating at a 75 percent load factor with a powerplant fired with coal, oil, gas, and nuclear fuels. 5/ The factors examined were land requirements, water pollution, air pollution, and solid waste. CEQ determined that the principal difference between oil and gas is in air pollution. CEQ estimates that a 1,000 MW oil-fired plant (using 1.5 percent sulfur fuel) without pollution controls would emit about 69 thousand tons of pollutants annually, while a similar gas-fired plant would emit only 13 thousand tons.

CEQ estimates that the 69 thousand tons from the oil-fired plant can be reduced to 38 thousand tons by installing control devices "based on control technology that is now available or that can be expected in the very near future." However, this is still about 3 times more than for a gas-fired plant. In the areas of land use, water pollution, and solid wastes, little difference was noted between oil and gas.

SUMMARY

If deregulation of natural gas prices should increase the supply of natural gas, the environment would not be appreciably harmed because the detrimental effects of natural gas production, transportation, and consumption are usually less than for other fuels. The most severe impacts would come from accidents such as blowouts, explosions, or oil spills if the gas were produced in association with oil. In the case of oil spills the maximum damage would occur in the offshore area.

Past experience seems to indicate the chances of an oil spill are greater if the oil is produced offshore than if it is shipped in tankers--1 in 14,000 vs. 1 in 50,000. However, since a large portion of the imported oil would be displaced by gas which is relatively pollution free, the volume of potential oil spills that we have calculated from the additional oil and gas production in 1985 are about the same as the volume that would not be spilled due to less tanker traffic (8 to 17 thousand bbls vs. 9 to 18 thousand bbls). Whether these amounts are significant from an environmental standpoint or whether spills from OCS production are "preferable" to equal spills from tankers would involve multiple variables, such as concentration of the spill, the chemical nature of the oil, water currents, location, and the weather.

On the basis of this information, the environmental advantages and disadvantages in the production and transportation stages seem about equal; but with the clear advantages of natural gas over other fuels in the consumption stage, deregulation of natural gas prices would seem to have an overall beneficial impact on the environment.

CHAPTER V

ECONOMIC AND SOCIAL IMPLICATIONS OF DEREGULATION

There is a general consensus that higher wellhead prices for interstate natural gas would result in some increase of natural gas supplies. However, there is concern whether economic and social impacts of deregulation outweigh the benefits of an increased natural gas supply. There is concern over the effect of deregulation on the Nation's recovery from a deep and prolonged recession. Deregulation of natural gas also has implications for the natural gas market in general and the different classes of consumers in particular regarding the price and availability of natural gas. Principal areas of concern are:

--the allocation of supply between the intra and interstate natural gas markets;

--the change in aggregate consumer costs resulting from deregulation, and

--specific effects on industrial and residential consumers.

IMPACT OF DEREGULATION ON THE NATIONAL ECONOMY

Our macroeconomic analysis compared the possible economic effects of continued low prices under regulation with the anticipated effects of higher wellhead prices of new natural gas. In 1974 the average regulated interstate wellhead price for lower 48 natural gas was about $.28 per Mcf--up from $.23 in 1973. The upward trend is continuing and the average 1975 price is estimated at $.35 per Mcf.

Under continued regulation it is estimated that the average price for interstate natural gas would increase $.05 per Mcf each year to 1985. Average intrastate gas prices are estimated to be $.50 per Mcf at the wellhead in 1975; they are projected to increase $.15 per Mcf each year until 1983 when a wellhead price of $1.75 per Mcf is reached (which is an equivalent price with oil) and to remain constant from 1983 through 1985.

Under deregulation the city-gate price of both interstate and intrastate natural gas is expected to rise to an average of about $2.10 per Mcf. This is essentially the Btu-equivalent of $12.00 per barrel imported or uncontrolled domestic crude at the refinery. The $2.10 per Mcf city-gate price is composed of $.35 per Mcf, which is the average interstate pipeline transportation charge, 1/ and $1.75 per Mcf, the average deregulated wellhead price. City-gate prices for

Alaskan gas, and Canadian and LNG imports are assumed to be constant under both regulation and deregulation at $2.10 per Mcf.

ECONOMIC PROJECTIONS

Economic projections were computed assuming that average city-gate prices for natural gas reach $2.10 per Mcf in 1980, or in 1985 to investigate the impact of varying scenarios of deregulated prices. These were compared with economic projections computed for continued regulation. The results of these calculations are shown in Table 7.

TABLE 7

Economic Projections Of Natural Gas Regulation and Deregulation
(Selected Years From 1976 to 1985)

	1976	1977	1979	1981	1983	1985
	(percent)					
Rate of change in real GNP						
Continued regulation	5.6	3.6	4.0	6.3	1.4	4.6
Deregulation phased to 1985	5.6	3.6	4.0	6.3	1.4	4.6
Deregulation phased to 1980	5.5	3.6	3.9	6.3	1.3	4.5
Rate of change in inflation rate						
Continued regulation	5.8	6.5	6.9	5.1	6.4	3.5
Deregulation phased to 1985	5.8	6.5	6.9	5.1	6.4	3.5
Deregulation phased to 1980	5.9	6.5	7.0	5.2	6.5	3.7
Unemployment rate						
Continued regulation	7.8	7.2	6.5	4.0	4.7	4.4
Deregulation phased to 1985	7.8	7.2	6.5	4.0	4.7	4.4
Deregulation phased to 1980	7.8	7.2	6.5	4.1	4.8	4.5

Source: GAO computations using the Wharton econometric long-term model.

Our simulations indicate no significant effects upon aggregate economic factors resulting from either deregulation per se or the pace at which prices would rise under deregulation.

Models such as the Wharton econometric long-term model are used to measure aggregate impact on the national economy. The absence of significant differences in our simulations is probably related to the small percentage of economic activity which the market for natural gas currently represents--about $20 billion out of a GNP of $1,300 billion. Under the pricing scenario used in our simulation, the maximum cost of deregulation in any 1 year would be $13 billion in 1980. Given the statistical accuracy of such models, a change of this magnitude may not be readily discernible.

The following portions of this chapter compare the effects on consumers of continued regulation versus deregulation phased through 1980 using the price assumptions described earlier.

THE MARKET FOR NATURAL GAS

Natural gas resources are added to reserves following the discovery and delineation of an economically producible field. Buyers of reserves are usually pipeline companies seeking natural gas for delivery to their final users, industrial consumers and retail public utility companies.

At the wellhead, the buyer (pipeline company) and the seller (producer) trade in contracts which are for a certain quantity of natural gas to be delivered over a specified number of years. Most contracts today have provisions for raising prices over the years in which the contract will be in force. Most transactions are for 10 to 20 years although recently contracts of 10 years or less have become more prevalent due to uncertainty over future prices of interstate gas.

In theory, in the absence of regulation the market would function to price each contract according to the amount of natural gas involved, the length of the contract, and any special provisions covered in the contract. The price would fluctuate in accordance with the bargaining power of the pipeline company and the producer.

Regulation has held the wellhead price for interstate gas below its market clearing price. This lower price has generated an excess demand for natural gas by the final user. Producers with reserves that are dedicated to interstate pipelines must sell new reserves created through revisions and extensions of these dedicated fields to the interstate pipelines at the regulated price.

New finds, however, do not necessarily have to be dedicated to the interstate market. New discoveries can be dedicated to the intrastate market provided they are not on Federal lands. New discoveries on Federal lands must be dedicated to the interstate market. Since the price for intrastate gas is 2 to 3 times greater than for interstate gas there is more incentive to drill for natural gas which can be sold in the intrastate market.

In theory the higher the price of natural gas, the more intensive will be exploration and development and the greater the finding rate. Possible natural gas supplies are expected to be found in considerable quantity on Federal lands, such as the OCS and Alaska, but this natural gas will be expensive to develop and produce. An increase in the interstate prices could make it profitable to develop marginal fields and to drill deeper onshore where large pockets of natural gas are assumed to be located. The greater the finding rate, the greater the rate of additions to reserves and the greater the potential production rate. Thus, deregulation and the resulting higher wellhead price for interstate natural gas should somewhat increase the flow of natural gas to interstate pipelines during the next 10 years relative to what can be expected if regulation continues.

REGIONAL IMPLICATIONS OF DEREGULATION

The regulation of the wellhead price of natural gas in interstate pipelines has weakened the relationship between the interstate and intrastate markets such that they are almost independent markets. Theoretically, this need not have occurred had the regulated price kept up with prices of other energy resources, particularly that for intrastate gas. But even in normal times there is some "regulatory lag" as estimates of past costs often do not reflect increasing future costs and consumers pressure the regulators to keep prices down. The rapid increase in prices for imported oil, has increased the impact of the regulatory lag on interstate natural gas prices and has resulted in interstate natural gas prices 2 to 3 times lower than intrastate prices. New interstate natural gas supplies are currently priced at 52 cents per Mcf at the wellhead, while new intrastate natural gas sells, on the average, for about $1.17 per Mcf at the wellhead. 2/ Some intrastate contracts for natural gas have been in excess of $2.00 per Mcf. The price of intrastate natural gas depends largely on the demand for natural gas in that State, the type of regulation that prevails there, and the price of alternative fuels.

Regulation has separated the domestic natural gas market into two parts--the interstate and the intrastate. This separation means that a natural gas producer can normally expect to get 2 to 3 times* more for his product in the intrastate market than in the interstate market. As a result there is no allowance for market adjustment to changing demand and supply conditions. This lack of adjustment generates forces which keep natural gas from its highest value end use.

Users in States with little or no natural gas production must get their natural gas from interstate pipelines. The low interstate prices relative to other energy sources create an excess demand for natural gas and, therefore, a rationing system must be devised which is not based on the price of natural gas. Some potential consumers are willing to pay much higher prices to use natural gas than the prices being paid by current users, but they are rationed out of the market. There is a loss to the potential consumer and a gain to the consumer who is currently tied in to a natural gas utility but would consume less gas if the price were higher. Under deregulation the price distinction between interstate and intrastate markets would be removed.

Interstate and Intrastate Gas Supplies

Even before the sudden rise in imported and new domestic oil prices, there were complaints of "regulatory lag." Essentially, the industry complained that the regulated price developed from the "cost plus reasonable profit" calculations of the FPC were based on past data which, even if reliable, would not be adequate to encourage exploration for new, higher cost future resources.

Reserve additions in recent years for the interstate and intrastate market clearly indicate the differing incentives. From 1964 to 1969 additions to reserves dedicated to the intrastate market had accounted for one-third of the total lower 48 additions to reserves. From 1970 to 1973 the intrastate share rose to 92 percent of total lower 48 additions. Out of an average 9.1 tcf per year total reserve additions for this period, 8.4 tcf

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* Recent action on the part of the FPC has allowed certain purchasers of interstate gas to purchase gas directly from the intrastate market at non-regulated prices, but this is currently a rare exception.

per year were dedicated to the intrastate market. 3/ A net of less than 1 tcf per year of lower 48 reserve additions were dedicated to the interstate market from 1970 to 1973.*

Continued low prices under regulation would probably result in continuation of the trend in which most of the exploratory activity and resultant reserve additions would be in areas whose production can be sold in the intrastate market, unless the FPC continued to allow interstate purchasers to purchase gas directly from the intrastate market. This would result in the interstate market bearing almost all the decrease in natural gas production through 1985 that has been discussed in chapter III. Under deregulation the price distinctions between interstate and intrastate markets would be removed and some natural gas would probably flow from formerly intrastate markets into the interstate pipeline network. Any subsequent decrease in natural gas supplies is assumed to be proportionately shared by the interstate and intrastate pipeline networks.

In 1973 intrastate natural gas supplies were 10.5 tcf. 1/ Under the continued regulation, lower 48 intrastate additions to reserves are assumed to remain at 92 percent of total lower 48 reserve additions, the intrastate share from 1969 to 1973. This results in an average 9.2 tcf per year of reserve additions for the intrastate market. Lower 48 intrastate production is assumed to fall .1 tcf per year until a production level equal to annual intrastate reserve additions is attained. There would also be some intrastate supplies in Alaska, 0.1 tcf in 1975 increasing to .2 tcf in 1980. All remaining natural gas supplies would be in the interstate market. Under deregulation, the relative shares of total 1975 natural gas supplies for the interstate (51 percent) and intrastate (49 percent) pipelines are assumed to remain constant through 1985. The regulated case refers to the lower 48 low supply case developed in chapter III; the deregulated case to the lower 48 medium case. Table 8 shows total supplies expected for interstate and intrastate pipelines for regulation and deregulation using the low and medium cases discussed in chapter III.

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* Excluding revisions to reserves, additions to reserves dedicated to the interstate market averaged 3.1 tcf per year from 1970 to 1974. However, the substantial negative revisions to interstate reserves lowered the average net interstate reserve additions to .7 tcf a year over this period.

Table 8

Total Natural Gas Supplies for Interstate and Intrastate Pipelines Under Regulation and Deregulation (tcf)

	Regulation			Deregulation		
Year	Total	Interstate	Intrastate	Total	Interstate	Intrastate
1975	21.4	11.0	10.4	21.4	11.0	10.4
1978	19.4	9.3	10.1	19.8	10.2	9.6
1980	18.1	8.1	10.0	18.8	9.6	9.2
1985	17.2	7.7	9.5	18.7	9.5	9.2

Overall, under continued regulation total supply to interstate pipelines is projected to fall 30 percent, while under deregulation it will only fall about 13 percent, as would the percentage for intrastate pipelines.

INCREASED CONSUMER COSTS OF DEREGULATION

Only under the very optmistic but unlikely circumstances of the high case in chapter III would deregulation result in total gas supplies in 1985 equal to total supplies in 1975. Over the period 1975 to 1985, some current consumers of natural gas will be forced to seek alternate energy sources to satisfy their energy needs even under deregulation. In 1975 total gas consumption was expected to be 21.4 tcf; therefore, the evaluation of the cost of the changing sources of energy supply for the energy equivalency of 21.4 tcf will provide an indication of the total consumer costs of deregulation of natural gas. The sources of energy supply after 1975 for natural gas consumers are:

1. Lower 48 interstate pipeline supplies which would exist with or without regulation.

2. Lower 48 supplies to interstate pipelines resulting from deregulation.

3. Intrastate pipeline supplies.

4. Natural gas supplies from Alaska, imports, and synthetic pipeline quality gas to interstate pipelines.

5. Alternate energy supplies such as oil or electricity.

Energy supplies from each of the five categories in 1980 and 1985 are illustrated in figure 4 under continued regulated low prices and under deregulation. The natural gas supply figures are based on the low and medium cases described in table 6 of chapter III; the alternate energy supply, category 5, is the shortfall in natural gas supplies relative to 1975. It is measured in the Btu-equivalent of natural gas.

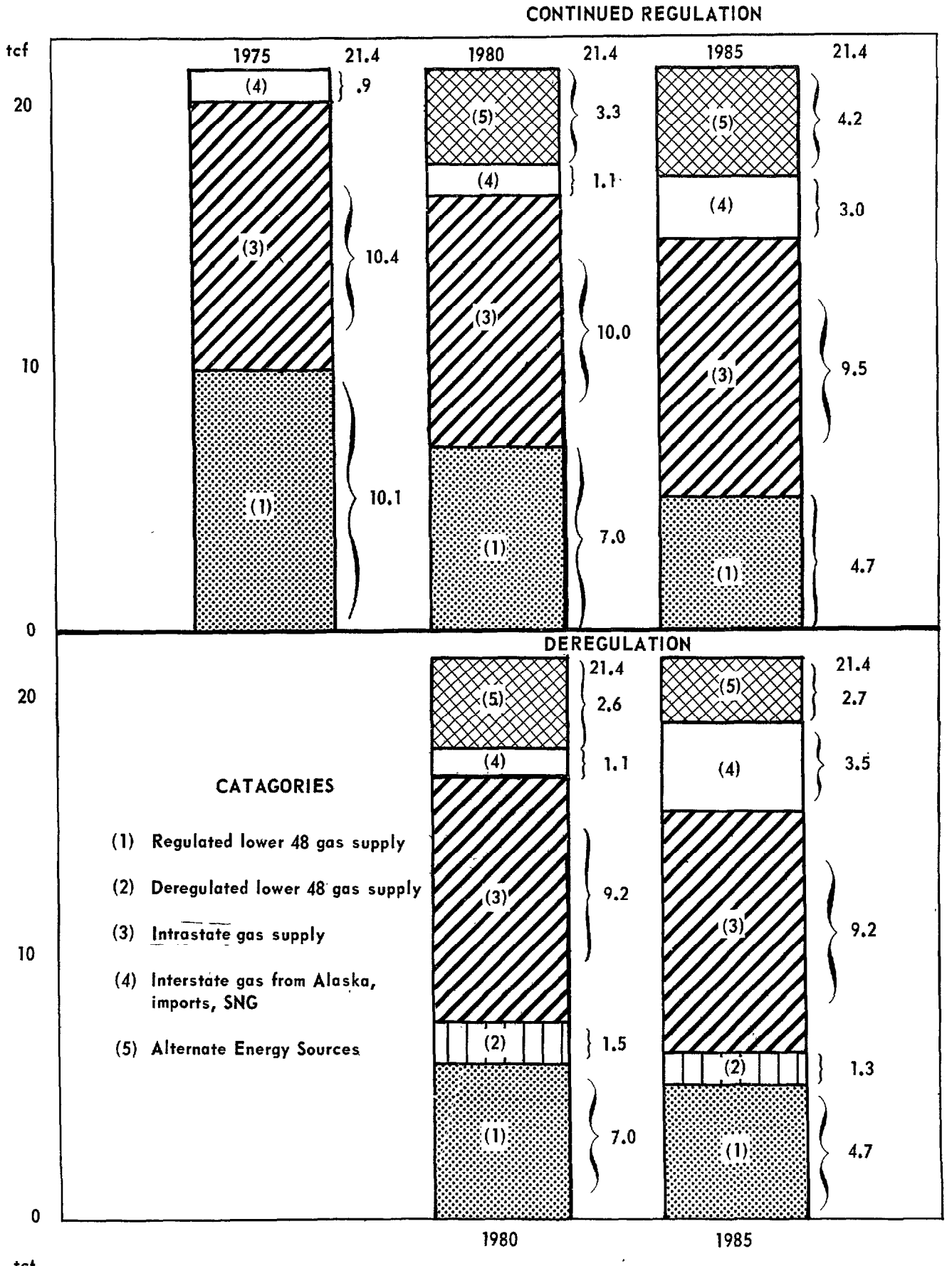
The energy supplies, from natural gas or alternate sources, in categories 2, 4, and 5 will be near to or exceed $2.10 per Mcf (the Btu-equivalent price of oil) at the city-gate regardless of whether there is deregulation or not. Under continued regulation increasing quantities of alternate fuels, such as oil are needed to help meet the energy demand that the 21.4 tcf of natural gas had met in 1975. Only under deregulation is there any natural gas in category 2, with a resultant reduction in the demand for alternate fuels (category 5).

Costs for intrastate supplies of natural gas, category 3, will be affected by deregulation since the interstate pipelines could then offer prices comparable to or in excess of current prices for new intrastate gas contracts. In 1974 average intrastate wellhead prices were about $.35 per Mcf, 4/ up from $.20 per Mcf in 1973. 5/ For purposes of calculation, we have projected a continuation of the $.15 per Mcf intrastate price increase for each year of continued regulation of interstate prices to reach an average wellhead price of $1.75 per Mcf in 1983. Under deregulation this $1.75 per Mcf price would be attained in 1980 because of competition between interstate and intrastate pipelines. Thus, under deregulation, costs per Mcf for intrastate pipeline supplies will be higher than regulated scenario prices until 1983.

Average wellhead prices for the interstate pipeline supplies in category 1 are projected to rise 5 cents per Mcf per year from a 1975 base of 35 cents per Mcf under continued regulation, while under deregulation natural gas prices would increase to $1.75 per Mcf at the wellhead and $2.10 per Mcf at the city-gate by 1980.

FIGURE IV

ENERGY SUPPLIES FOR 1975 NATIONAL GAS CONSUMERS BY CATEGORY



The total change in city-gate energy prices outlined below to the consumers of the 21.4 tcf of natural gas in 1975 under regulation and deregulation scenarios is an upper limit. Consumer response to the higher prices of energy in the form of conservation would reduce this net increased cost of energy. Also these cost projections are based on the assumption that the deregulated average price would rise to $2.10 (city-gate) by 1980 which is a rapid increase and probably would require renegotiation of some existing contracts. These calculations are made to establish the maximum probable costs of deregulation. The net consumer costs of deregulation under these assumptions are illustrated in table 9 for selected years from 1975 to 1985.

Table 9

City-Gate Costs of Energy Regulation and Deregulation to Consumers of Natural Gas in 1975
(billions of dollars)

Year	Regulation	Deregulation	Net Cost
1975	17.8		
1978	26.7	35.0	8.3
1980	31.9	44.9	13.0
1985	40.6	44.9	4.3

The table indicates that in 1975 it is projected that 21.4 tcf of natural gas will be delivered to consumers at an average city-gate price of $.83 per Mcf for a total cost of $17.8 billion. In 1980 it is projectd that, under continued regulation, 18.1 tcf will be delivered to consumers at an average city-gate price of $1.37 per Mcf for a total cost of $24.9 billion. Since 3.3 tcf of 1975 natural gas consumption must be replaced by other energy sources at an equivalent city-gate price of $2.10 per Mcf, there is an added $7 billion cost to the consumer, giving a total cost to the consumers of $31.9 billion. This is an increase of $14.1 billion or 79 percent over their costs for the same amount of energy in 1975.

Under deregulation natural gas consumption is 18.8 tcf in 1980 at an average city-gate price of $2.10 per Mcf for a cost of $39.5 billion; the cost for the alternate energy sources to replace the 2.6 tcf shortfall relative to 1975 ($2.10 per Mcf equivalent) is $5.4 billion. This gives a total cost of $44.9 billion. Thus under deregulation city-gate costs for 1975 natural gas consumers would increase $27.1 billion in 1980 over 1975, or $13 billion over what the 1980 costs would have been under continued regulation. Under deregulation city-gate costs in 1980 will be 152 percent greater than 1975 costs and 41 percent greater than 1980 costs with continued regulation. These same calculations for 1985 indicate that deregulated costs would continue at $44.9 billion (152 percent greater than 1975) and regulated costs would climb to $40.6 billion (128 percent greater than 1975); in 1985 deregulation costs would be 11 percent greater than regulation.

Although there are considerable increases in consumer costs resulting in deregulation, even under continued regulation, prices for energy to 1975 natural gas consumers will escalate by 1985 to a point where the total costs to the consumer under regulation or deregulation will both be more than double the costs in 1975. Under deregulation the net costs to the consumer relative to deregulation would grow until 1980 at which time the net cost would begin to decrease. The cumulative cost of deregulation through 1980 is $42 billion and $75 billion through 1985. These are increases of 28 percent and 22 percent over the cumulative costs of continued regulation.

The reason for the decrease in net costs to the consumer after 1980 is that by 1980 deregulated prices would have reached their $2.10 per Mcf maximum while under the regulated scenario

--the regulated interstate and intrastate prices would continue to rise and

--the growing shortfall of lower 48 natural gas would result in the substitution of $2.10 per Mcf natural gas from imports, Alaska, and SNG and alternative fuel sources such as oil or electricity.

The question of net cost to the consumer reduces itself to a question of long-term versus short-term effects. Under regulated low prices low cost natural gas would disappear anyway, it would merely take longer than under deregulation. Continued regulation, with not only a decline in low-priced natural gas supplies but also a decline in total gas supplies, could pose serious problems for the Nation if supply shortages

become of sufficient magnitude that there would be competition between residential and industrial sectors for the increasingly scarce natural gas supply in the interstate market such that the FPC might have to reconsider its current allocation priorities. El Paso Natural Gas, for example, has announced that it expects complete winter cut-off of its heavy industrial and utility customers starting this winter, its large commercial customers beginning in 1980, and some residential curtailments by 1982. 6/ The additional 2 tcf or so that would result from deregulation could, at least, delay such impacts so that a more orderly transition to alternate fuels on the part of some consumers could be accomplishsed.

The higher wellhead prices for interstate gas would increase revenues per Mcf for producers who sell to interstate pipelines. For lower 48 production, gross revenues in 1975 are estimated to be about $9 billion. Under continued regulation revenues would be about $18 billion in 1980 versus $31 billion with deregulation. This is not to say that net earnings would be increased proportionately. The cost of future natural gas production from the OCS and deeper onshore reserves is expected to be high. The higher revenues would provide added incentives to develop these expensive resources. The added revenue could be used in several different ways:

--Investment in exploration and development of natural gas resources

--Investment in other energy sources and industries

--Investment in nonenergy sectors of the economy; and

--Large dividends to stockholders.

Firms may take some or all of the above options. Much of the support for decontrol stems from hope for additional production expected to be stimulated by the increased prices.

Ideally producers should increase investment expenditures in the area of exploration and development of natural gas. Increased investment in other energy sources and industries could be as desirable from an overall energy standpoint. However, if firms choose not to invest the increased profits into natural gas or other energy sources considerable political

pressure could occur perhaps resulting in legislation requiring reinvestment, or reinstituting price controls on natural gas. In fact, reinvestment requirements could be made part of any deregulation legislation.

INDUSTRIAL IMPACT OF DEREGULATION

Many industries which now use natural gas will be subject to higher fuel costs whether deregulation occurs or not. Should natural gas regulation continue, it appears interstate natural gas supplies for industry will be less available forcing some to use higher cost alternative fuels to continue operations. Following deregulation, those industries may find natural gas becoming available again but at prices perhaps equal to or exceeding the Btu-equivalent prices of the alternate fuels.

Recent interstate prices for industrial natural gas averaged $.71 per Mcf. A change in wellhead prices for interstate gas from $.35 to $1.75 would raise industrial natural gas prices to about $2.10, three times current prices.

In the aggregate natural gas accounted for 37.8 percent of all industrial energy consumption in 1974. The amount of expenditures by industry for natural gas supplies in 1974 was approximately $6 billion with total industrial output about $850 billion. Thus natural gas expenditures by industry were less than 1 percent of the overall value of industrial output, and, in the aggregate, the impact of higher prices for natural gas on industrial prices is expected to be negligible, as demonstrated by the macroeconomic calculations in table 7.

However, effects of deregulation would vary for individuals industries. While natural gas accounts for 38.4 percent of total energy consumption in the primary copper industry, primary energy comprises only 3.8 percent of the copper industry's selling prices. A trebling of natural gas prices would raise the average price of copper products about 3 percent. On the other hand in the Portland cement industry (wet process), natural gas accounts for 40 percent of total energy consumption, and energy comprises almost 20 percent of the industry's selling price. A trebling of natural gas prices would raise cement prices for this process about 16 percent.

The consumption of natural gas by industry has fallen recently. Between January and April 1975 industry used 7 percent less natural gas than over the

same period in both 1974 and 1973. Some of this decline in consumption occurred because of current economic conditions, but some of it was a direct result of the natural gas shortage. Many of the companies with actual shortages of natural gas have been able to obtain alternate fuels, mostly coal, oil, or propane and will continue operations regardless of natural gas curtailments. 7/

Some industries already maintain dual fuel capability and will use the least costly available fuel. While some industries would have difficulty changing fuels on short notice, the major gas consuming industries could reduce their dependence on natural gas within 2 to 5 years. 8/ This "capability," of course, is dependent on many variables such as the availability of alternate fuels and their prices, the availability of funds and equipment needed to comply with environmental regulations. Table 10 shows the major industrial natural gas consumers during 1971 as reported by the Commerce Department.

Table 10

Natural Gas Consumption by Industry

Industry	Percent of total industrial consumption
Petroleum Refining	20.1
Industrial, Chemicals, Plastics, and Rubber	19.5
Steel	9.8
Pulp and Paper	6.3
Lime and Hydraulic Cement	3.7
Motor Vehicles	1.4
Food	1.4
Glass	3.4
Non-Ferrous Metals	3.5

The following profiles 9/ of the three largest gas consuming industries are indicative of industry's capability to change fuels in the event natural gas in unavailable.

1. Petroleum Refining Industry

The petroleum refining industry is the largest industrial user of natural gas. Refineries, except those on the Gulf coast, usually are designed with duel oil and gas fuel systems and furnaces. These designs permit full refinery

operations on either type of fuel. Refineries on the Gulf coast are almost exclusively designed for natural gas since it has been the most readily available cheap fuel in the area. Therefore, except for the furnace design problems of Gulf coast refineries, the petroleum industry is capable of using oil in lieu of gas.

2. Industrial Chemicals, Plastics, and Rubber

The chemical industry is the second largest industrial consumer of natural gas. The industry has unique requirements for natural gas where it serves as a raw material or feedstock for a number of major products. Petrochemicals based on natural gas include ammonia, methanol, chlorinated hydrocarbon solvents, cyclohexane and related compounds. However, boiler fuel use accounts for the largest portion of the chemical industry's natural gas use. For example, 50 to 60 percent of the industrial chemical industry's natural gas has been used as boiler fuel.

Ammonia production consumes about 74 percent of the natural gas used as feedstock by the chemicals industry. Other fuels cannot substitute for natural gas as feedstock in existing ammonia plants. Ammonia is the base product for 95 percent of all U.S. fertilizer production and few ammonia plants can operate at less than 70 percent of capacity. Interruption of natural gas supplies to ammonia plants would reduce nitrogen fertilizer production in direct proportion to the extent of curtailment.

Natural gas provides about 44 percent of the plastics and synthetic rubber industry's fuel requirements. This industry group has substantial opportunities to switch to other fuels in the long run but at considerably increased costs.

3. Steel Industry

The iron and steel industry accounts for about 10 percent of industry's natural gas consumption. Four furnace processes consume 92 percent of the steel industry's natural gas supply mainly for heat treating and billet reheating. A variety of fuels are used in open hearth firing and most installations can use alternative fuels. The iron and steel industry could significantly reduce its dependence on natural gas over several years.

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Industrial users of the high priced gas and alternative fuels would attempt to pass the higher price onto the consumer. Production could possibly decrease, but the magnitude is not known. For firms where energy costs are a large proportion of total costs, retained earnings or dividends, or both, could decline. The impact of the price increase may be negligible for those firms whose energy costs are a small proportion of the firm's total costs.

The major impacts of natural gas shortages would be mostly in industries for which natural gas has a unique material or quality heating value rather than for its Btu energy value and for which there is no practical substitute (such as the fertilizer, plastics, certain textile and baking industries). For these industries price considerations would be mostly secondary to obtaining adequate supplies of natural gas.

Regional Industrial Impacts

The region with the highest industrial dependence on natural gas is the major southern gas producing region. Mississippi, Arkansas, Louisiana, Oklahoma, and Texas manufacturers consume more than 70 percent of the area's natural gas and their general area consumes about one third of the Nation's supply each year. However, a recent study 7/ indicated that the industries most likely to be affected by current and continued shortages are in the fourteen States most severely affected by curtailments, the mid-Atlantic States, several mid-western States (Ohio, West Virginia, and Kentucky), and to a lesser extent Missouri, Iowa, and California. The shortages projected for the 1975-76 winter follow the pattern of the previous year's shortages. Under continued regulation gas dependent industries have an incentive to locate in the producing areas to gain access to intrastate gas.

RESIDENTIAL IMPACT OF DEREGULATION

Although natural gas is currently the lowest cost residential fuel, its price to consumers has increased 42 percent between 1969 and 1974. In 1974 the average nationwide cost of natural gas for residential service was about $180 per household. Although the natural gas shortage has greatly concerned consumers, the Federal Power Commission expects most residential customers to continue to receive service. To protect residential consumers' gas supply, the FPC has given them highest priority under pipeline curtailment plans. Thus under the continued regulation of natural gas wellhead prices it is expected that residential consumption of interstate

Table 10

Retail Prices for Residential Natural Gas ($/Mcf)

Year	Regulation	Deregulation
1975	1.50	1.50
1978	1.76	2.27
1980	1.98	2.77
1985	2.52	2.77

natural gas would remain relatively constant despite falling supplies. Under deregulation residential consumers would pay higher prices for these same supplies.

The current retail price to residential consumers for natural gas is about $1.50 per Mcf. Table 10 illustrates the retail price per Mcf to the residential consumer resulting solely from the changes in wholesale prices of natural gas described on pages 41 to 46.

Under deregulation residential natural gas prices per Mcf in 1980 are expected to be 40 percent higher than what they would be under continued regulation. Prices to the consumers will increase regardless of deregulation until by 1985 there is only a 10 percent difference between deregulated and regulated prices.

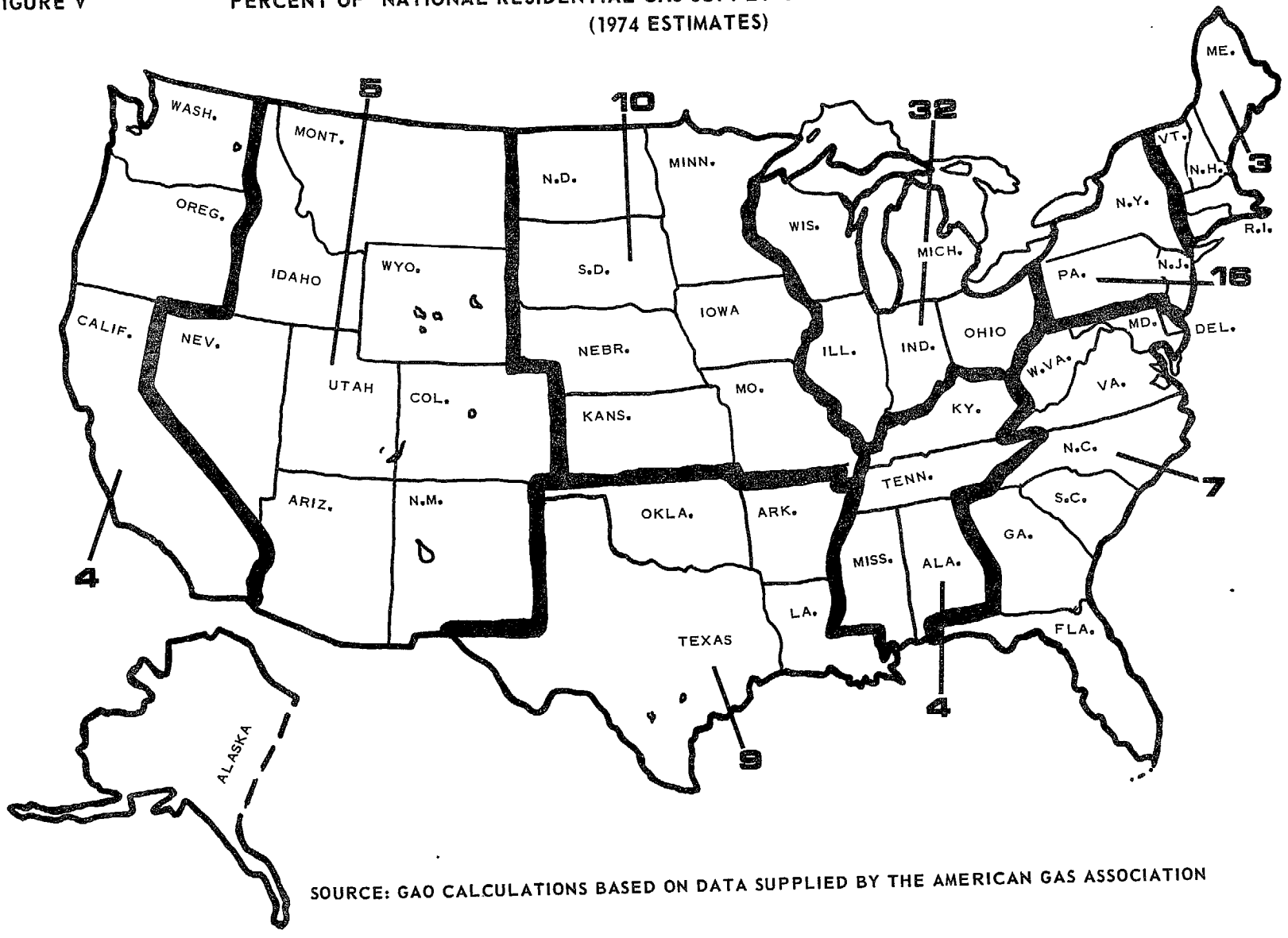
In 1974 average prices for residential natural gas consumption was $1.50 per Mcf, and the average yearly bill for the residential customer was $180. If residential consumption of natural gas remains constant despite price increases and residential prices change only due to changes in gas prices this can give an indication of the increase in residential consumer bills resulting from deregulation. From 1980 on residential bills would average $331 under deregulation, a $94 increase over what it would have been in 1980, under continued regulation, but only $30 more than continued regulation in 1985.

Figure 5 illustrates the geographic distribution of residential gas consumption. The regions with highest residential consumption of natural gas are the East North Central and Mid-Atlantic. It could be expected that the increased costs of deregulation would be distributed in somewhat the same proportions.

Energy, like other necessities such as food and housing, consumes a considerably larger portion of a poor family's budget than it does for more affluent groups.

FIGURE V

PERCENT OF NATIONAL RESIDENTIAL GAS SUPPLY CONSUMED IN EACH REGION
(1974 ESTIMATES)



SOURCE: GAO CALCULATIONS BASED ON DATA SUPPLIED BY THE AMERICAN GAS ASSOCIATION

Table 11

Percentage of Family Income
Spent on Energy and Natural Gas
(1972-73)

Average Family Income ($)		Average Annual Btu's (Millions per Household)	Average Annual Cost per Household	Percent of Total Annual Income Spent on Energy
2,500				
	Total Energy	207	$379	15.2
	Natural Gas	118	147	5.9
8,000				
	Total Energy	294	572	7.2
	Natural Gas	129	153	1.9
14,000				
	Total Energy	403	832	5.9
	Natural Gas	142	166	1.2
24,500				
	Total Energy	478	994	4.1
	Natural Gas	174	200	.8

Source: "A Time to Choose: America's Energy Future", Energy Policy Project of the Ford Foundation (Cambridge, Mass., Ballinger Publishing Co., 1974).

The poor are also least likely to have insulated residences and consequently burn more fuel to heat a smaller living area. Table 11 indicates the percentage of family income spent on energy and natural gas by income status from 1972-73.

Table 11 shows poor families spend about 15 percent of their incomes on energy, while higher income groups spend from 7 to 4 percent of their income on energy. Because of these relationships, any increases in natural gas prices would be felt most by poor families forced to spend an even larger portion of their incomes on energy.

In the final analysis the question of impact of natural gas upon residential consumers is on the relative importance of short-term versus long-term effects. In the short-term natural gas deregulation will result in higher residential prices; but in the long-term prices would be comparable under either case.

CONCLUSIONS

Under regulation the natural gas market would continue to be divided into separate interstate and intrastate segments. This would result in the interstate market carrying most of the shortfall in natural gas supplies. Since FPC regulations give priority to residential consumers, almost all the interstate shortfall would be in the industrial and commercial sectors. Deregulation would unify the interstate and intrastate markets. Any shortfalls that occur in natural gas supply would be shared proportionately by both markets.

In the short run (1980) deregulation would raise consumer costs, particularly residential, about 30 to 40 percent; but in the long run (1985) consumer costs under both regulation and deregulation would be comparable. The short term negative price impacts of deregulation versus regulation should be weighed against the facts that deregulation and regulation price impacts are comparable by 1985 and that deregulation could increase gas supplies 1.5 to 4 tcf.

Most residential customers in the interstate market should continue to receive service in the event of continued regulation and lower supplies, at least through 1985. Whether deregulation occurs or not, most industrial customers will pay higher prices either because of higher gas prices or the necessity to purchase expensive alternatives. The increased supplies will provide more assistance to industrial customers, particularly those who use natural gas as a material rather than as an energy source.

In the end the energy consumer pays for the cost of energy in one form or another. In the aggregate, the consumer pays for his energy resources directly or indirectly--he pays in the price of natural gas, in the environmental impact, in higher taxes (due to taxes foregone), and in paying for higher cost energy alternatives since he cannot purchase natural gas. No matter what system is used to allocate resources, some consumers gain and some consumers lose. Thus, from an economic viewpoint, the question of deregulation of natural gas comes down to a matter of trade-offs: which segments of society should bear the cost of energy? These are important decisions since energy demand will almost surely increase in the foreseeable future. The rate may be slower or faster due to price changes, new inventions, changes in tastes, etc., but demand is likely to grow in years ahead.

CHAPTER VI

FINDINGS AND CONCLUSIONS

THE PROCESS OF DEREGULATION

1. Although this study discusses the possible consequences of price deregulation, most of these consequences could occur under continued regulation with higher regulated prices which approximated market prices. Price is the key to the supply and economic implications discussed in this study and, in theory at least, prices could rise by comparable amounts in the context of either deregulation or continued regulation. The question of deregulation then, is not so much a question of increasing natural gas supplies as it is a question of the social and economic desirability of government-determined versus market-determined natural gas prices.

2. While deregulating the price of natural gas (or higher regulated prices) would generate more production, would improve interstate access to intrastate supply, and would provide new exploratory capital, it would also increase the Nation's natural gas bill. A deregulatory action should attempt to balance the following factors:

--The need for more exploration and development.

--The impact of increases in retail prices.

--The overall national económic impact.

--Excessive growth in industry's profit levels.

The balancing of the above objectives is based on considerations of timing and coverage. The longer the decontrol period and the more limited the supply affected, the fewer the supply incentives and economic consequences. Finding the best combination of timing and coverage is the key to deregulation.

3. As indicated in a GAO report of September 8, 1975 (RED-76-11), many contracts between producers and pipelines have been written with indefinite pricing clauses, particularly in recent years--although the FPC does not recognize such clauses. The clauses are apparently in anticipation of some form of price deregulation by the Congress. The Congress should recognize the existence of indefinite pricing clauses in existing contracts and express its intentions regarding such clauses in any possible deregulation legislation.

ENERGY IMPLICATIONS

1. Natural gas production in 1975 is expected to be about 21 tcf. The major impact of deregulation on future natural gas supplies between now and 1985 would be on production from the lower 48 States. It would have little or no positive impact on natural gas from Alaska, Liquefied Natural Gas Imports, or Canadian imports. It could have a negative impact on Synthetic Pipeline Quality Gas. Under continued regulation at or near current prices, natural gas supplies in 1985 would be about 17 tcf--20 percent below 1975 supplies. With deregulation natural gas supplies would fall about 13 percent below 1975 supplies to 19 tcf. Only under highly optimistic, unlikely circumstances would natural gas supplies in 1985 remain at or near 1975 levels.

This conclusion is based primarily on an analysis of the level of reserve additions that will be required to attain a given amount of production within the next 10 years. The level and composition of reserve additions over the last 30 years indicates the probable limits of future levels of reserve additions. The fact is that over the last several years the United States has been producing and consuming natural gas at a faster rate than additional reserve finds, and any significant increase in reserve additions requires an unprecedented rate of new finds. The probable major impact of high prices on production in the lower 48 States would be to slow, but not to reverse, the downtrend of production.

2. The additional production that deregulation might generate could reduce requirements for imported oil by about 750,000 bbls per day if it displaced imported oil on a one-for-one basis. At current prices this would improve the annual balance-of-payments position, increasing to an annual figure of $3 billion by 1985.

ENVIRONMENTAL IMPLICATIONS

If deregulation of natural gas prices should increase the supply of natural gas, the most severe impacts would come from accidents such as blowouts or explosions, especially if the gas were produced in association with oil. The maximum damage in such a case would occur in the offshore area. If increased natural gas supplies substitute for imported oil, the environmental advantages and disadvantages in the production and transportation stages would be about equal. However, with the clear advantages of natural gas over other fuels in the consumption stage, deregulation of natural gas would seem to have an overall beneficial impact on our environment.

ECONOMIC AND SOCIAL IMPLICATIONS

1. Continued regulation and deregulation cases indicate no real difference in macro-economic activity. The economic indicators used in our study--growth of GNP, the rate of inflation, and the rate of unemployment--are substantially the same under regulation or deregulation. This is as expected since the market value of gas is only about $20 billion (1973) in an economy with a GNP of $1,300 billion.

2. Deregulation will smooth out the distribution of supplies between the intra- and interstate markets. Under continued regulation virtually the entire shortfall in future production would occur in the interstate market (31 percent below 1971 levels). With deregulation the interstate market will be able to compete for supplies on an even basis, and future production is expected to be spread accordingly (about 13 percent below 1975 levels in each market).

3. In the aggregate, additional fuel costs for industry resulting from either deregulation or the need to use alternatives should not be large. Total industry expenditures in 1974 represented less than 1 percent of the monetary value of industrial output. However, some industries will be severely affected. These can generally be classified as industries (1) for which natural gas costs represent a large portion of their selling price (such as the cement industry) or (2) which depend upon natural gas for its unique material value rather than for its energy value and for which there is no practical substitute (such as fertilizer, plastics, and certain textile and baking industries).

4. Since FPC regulations give priority to residential customers in times of shortages, most interstate residential customers would continue to receive supplies under continued regulation; but deregulation would increase the residential consumers costs by 40 percent in 1980 and 10 percent in 1985 over what it would be under regulation. This is an increase of $94 and $30 respectively over what the average residential bill would be under continued regulation.

5. Deregulation would increase producers gross revenues from an estimated $9 billion in 1975 to $31 billion in 1980 versus $18 billion with continued regulation. This is not to say that net earnings would be increased proportionately. The cost of future natural gas production from the OCS and deeper onshore reserves is expected to be high. The added revenues would provide added incentives to develop these expensive resources.

CHAPTER NOTES

CHAPTER II

1/ Five standard sources were used in the development of this chapter. They are:

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--M. A. Adelman, The Supply and Price of Natural Gas (Oxford: Basil Blackwell, 1972);

--C. A. Hawkins, The Field Price Regulation of Natural Gas (Tallahassee, Fla.: The Florida State University Press, 1970);

--R. B. Helms, Natural Gas Deregulation (Washington, D.C.: American Enterprise Institute, 1974);

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2/ Phillips Petroleum Co. v. Wisconsin, 347 U.S. 674 (1954).

CHAPTER III

1/ Gas Supply Review, Supplement, May 15, 1975, p. 3.

2/ U.S. Department of the Interior, Bureau of Mines, Minerals and Materials, a Monthly Survey, (November 1975), p. 31.

3/ International Petroleum Encyclopedia, (1975), pp. 227-228.

4/ USGS Circular 725, Geological Estimates of Undiscovered Recoverable Oil and Gas Resources in the United States (1975), pp. 4-5.

5/ Dan McNabb, Hopes Wane for Big New Reserves in Eastern Gulf, The Oil and Gas Journal, v. , March 10, 1975, pp. 21-24.

6/ FPC Preliminary Investigation of Non-Producing Gas Reserves (February 1975).

7/ U.S. Department of the Interior, Federal and Indian Lands, Oil and Gas Production, Royalty Income, and Related Statistics, 1920 through 1974 (June 1975).

8/ Gas Supply Review, v. 3, (January 15, 1975), pp. 26-27.

CHAPTER IV

1/ FPC Report, Natural Gas Survey, vol. 1, p. 214.

2/ Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the U.S. and Canada and U.S. Productive Capacity as of December 31, 1974, Published jointly by the American Gas Association, American Petroleum Institute and the Canadian Petroleum Association, vol. 29, May 1975, Table I, p. 114.

3/ Ibid., Table XVIII - 2, p. 196 and Table II, p. 24.

4/ Department of Transportation, U.S. Coast Guard, Polluting Incidents in and Around U.S. Waters, annual report.

5/ Energy and the Environment, Electric Power Council on Environmental Quality, August 1973.

CHAPTER V

1/ Kumins, Lawrence, Economic Impact Report on Deregulation of Natural Gas, The Library of Congress, Congressional Research Service, November 5, 1974.

2/ Testimony presented by Mary Jane Klipple, staff consultant, Foster Associates, Inc., before Federal Power Commission, July 18, 1975.

3/ A Realistic View of U.S. Natural Gas Supplies; Staff Report, Federal Power Commission, December 1974, p. 17.

4/ Calculated using American Gas Association 1974 Gas Facts and Federal Energy Agency Monthly Energy Review.

5/ A Preliminary Evaluation of the Cost of Natural Gas Deregulation, Inter-Agency Task Force, Federal Power Commission, January 1975.

6/ International Gas Technology Highlights, v. V, (July 7, 1975), p. 1.

7/ The Economic and Environmental Impact of Natural Gas Curtailments During the Winter of 1975-76, U.S. General Accounting Office, RED-76-39, October 31, 1975.

8/ Impact of Prospective Natural Gas Curtailments on U.S. Industry, Preliminary Draft, Bureau of Domestic Commerce, U.S. Department of Commerce, September 6, 1974, p. 1.

9/ Ibid., pp. 14-40.

NINETY-FOURTH CONGRESS
Congress of the United States
House of Representatives
COMMITTEE ON GOVERNMENT OPERATIONS
2157 Rayburn House Office Building
Washington, D.C. 20515

July 26, 1975

B-181503

The Honorable Elmer B. Staats
Comptroller General of the United States
Washington, D. C. 20548

Dear Elmer:

The Conservation, Energy and Natural Resources Subcommittee has been investigating the severe natural gas shortage which the nation is almost certain to experience this winter. On June 12, the subcommittee held a hearing at which witnesses from the Federal Power Commission and the Federal Energy Administration testified as to the predicted extent of natural gas curtailments for industrial users this winter and the Federal government's proposed strategy for dealing with this problem.

We are requesting you to undertake a two-part study for the subcommittee. First, we would like you to give us your best judgment of the social, economic, environmental and other consequences that would result this winter from natural gas curtailments of the magnitude being forecast by the Federal Power Commission. If possible, tell us specifically what industries will be most severely impacted and what alternatives are available to them. This information would be extremely helpful to us during the course of our current investigation. It would be particularly valuable if you could supply this information for us as soon as possible, even if this means that you would have to appropriately limit the scope of your study.

Secondly, both the FPC and the FEA testified before the subcommittee that the long-term answer to this country's natural gas shortages is to deregulate the price of gas in the interstate market. We request that, as a second phase of a report to our subcommittee, you assess the social, economic, natural resource and environmental impacts that would result if a decision were made to deregulate the price of interstate natural gas. Among the questions we would ask you to address is how much additional natural gas would be produced in the two years following a decision to deregulate that would be attributable to the resulting price increases

APPENDIX I

for interstate natural gas. We recognize that such a study would take a significantly longer period of time to accomplish than phase 1.

Our staff will be happy to assist you in structuring this study.

With best wishes, I am

Sincerely,

Jack Brooks
Chairman

cc: The Honorable William S. Moorhead
Chairman, Conservation, Energy, and
Natural Resources Subcommittee
Committee on Government Operations

The Honorable Gilbert Gude
Ranking Minority Member
Conservation, Energy, and
Natural Resources Subcommittee

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